FOOD INDUSTRIES

manufacturing and processing

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Two Congressional Bills That Should Become Law

IF EITHER or both of the two measures known as the Mapes bill and the Hope bill are made law by Congress, those most affected thereby will be, at first, the canners and the distributors of canned foods, and later on, in all probability, the manufacturers and distributors of other packaged foods. Each would give the consuming public the advantage of better knowledge than is now possible of what is in a can of food before the can is opened, but through different avenues of approach.

BY THE TERMS of the Mapes bill, substandard canned foods are to bear informative labeling that will identify them to the consumer as such, and by "substandard" the canner means fourth-grade stuff. Intrinsically, there is nothing the matter with substandards except that consumers are always dissatisfied when they eat them; when in this category, corn is tough, peas are hard, tomatoes are watery and broken to bits, and so on down the list. The food is wholesome, but nobody enjoys it.

AT PRESENT, it is quite impossible for the consumer to identify a substandard can of food by any means other than its price, and even price is misleading at times. The Mapes bill will require these substandards to be labeled plainly that they are substandards, thereby enabling the consumer to know what is being purchased. The Mapes bill has teeth: it is offered as an amendment to a criminal statute, the Food and Drugs Act of 1906, and the Secretary of Agriculture is charged with its enforcement.

ON THE OTHER HAND, the Hope bill would empower the Secretary of Agriculture to establish definitions for *all* the quality grades of canned foods and so administer the law that the government would act as a grading agency when so desired, the owners of such canned foods being permitted to declare the government grades on the label. Essentially, the Hope bill is but an extension of some of the provisions of the existent Federal Warehouse Act, under which the government grades canned foods accepted for storage in federally licensed warehouses.

CERTIFICATES of quality so issued, attached to warehouse receipts, are the basis of collateral loans, but only in connection with licensed warehouses and by a licensed inspector. If the owner of goods wants federal inspection and certification he must ship the goods to a specific type of warehouse. The Hope bill will permit the inspector to grade the block of goods anywhere at the request of those financially interested, and the certificate may be used to define a tender or be the basis for a declaration of grade on the label.

HOWEVER, this difference exists between the two bills: the Mapes bill is mandatory and the Hope bill is not. It is a marketing measure. The Mapes bill is concerned with none but the 5 to 10 per cent that constitutes the foods of lowest quality; the Hope bill includes all grades. Federal grade certificates under the Hope bill "shall be receivable as prima facie evidence of the truth . . . in all courts of the United States."

NEITHER BILL conflicts with the other and each contributes to the same desired end: truth in labeling. FOOD INDUSTRIES believes that both will have a beneficial effect, not only on the canning industry but on food manufacture in general.

EDITORIALS

MARCH, 1930

The Sugar Refiner's Opportunity

IT WILL BE RECALLED that the thermophilic group of bacteria is made up of types which thrive at relatively high temperatures—growing best at about 130°F. but growing well at 150°F. or even higher. Their chief significance to the canning industry, however, lies in the fact that those thermophilic bacteria which are of importance in canning operations form spores of extraordinarily high resistance to heat.

It has been only a few years since the research laboratory of the National Canners Association definitely ascertained the conditions under which these bacteria could thrive in a canning plant, and only three years since it was discovered by Dr. E. J. Cameron and his associates that the offending bacteria can come into the factory in standard refined sugar, both beet and cane. Dr. Cameron's findings in this respect have been confirmed by Dr. L. H. James, of the Bureau of Chemistry and Soils.

The canner's problem has been treated simultaneously from two angles: first, as to the means of entry of thermophilic bacteria into the canning plant, and second, as to the operating conditions within the plant which might lead to excessive thermophilic growth. Sugar appears to be the outstanding source of thermophilic contamination. That soil might also be a carrier of this type of infection has been confirmed, but all available data place soil in a very minor position as a medium of contamination. Of a large number of sugar samples examined, a majority have been shown to carry one or more of the three types of spoilage thermophiles, while the great majority of soil samples have given negative results by direct culture methods.

As the problem now stands, it is regarded that sugar which carries high thermophilic contamination may lead directly to spoilage, especially in products of slow heat penetration, such as canned corn. Where there is a lower degree of infection, spoilage may be caused indirectly through the contamination of canning equipment in which food materials are heated and where the temperature at one time or another favors thermophilic growth and sporulation.

Some thought has been expressed that undue emphasis has been placed on the rôle played by sugar in spoilage difficulties. Any valid arguments against its outstanding importance as an initial source of infection should logically depend upon the existence of data showing other sources to hold greater, or at least equal, significance. No such data have come to our notice.

Our interest lies in the fact that sugar refiners are overlooking a bet when they fail to recognize that the company that can offer pea or corn canners a sugar guaranteed to be free from thermophilic spores will reap a fair-sized reward. The statement that all the sugar used in canning non-acid vegetables bears an insignificant relation to the total output probably is true, but to ignore the situation on this account is exceedingly narrow reasoning. Sugar that is bacteriologically clean when it leaves the refinery carries with it a general recommendation that may well be found to have a more far-reaching effect than appears possible at first glance.

Success in capturing this potential market will not be won by denying the presence of thermophiles in sugar, nor by setting up a smoke screen of dispute over the other possible sources of this form of bacterial infection. Far-sighted refiners ought to be conducting the necessary research today that will enable them tomorrow to offer sugar that will relieve the canner of possible worry from this source. Apparently only one or two refiners in the country have been able to see the possible connection between increased business with canners and freedom from these bacteria. Yet, the production of sugar that is free from thermophilic spores will put a very telling argument in the hands of brokers who are soliciting business from canners, for today any canner who packs non-acid crops that require sugar, such as peas or corn, can never know when trouble may come via the sugar route. Herein lies the opportunity!

Co-operation and Control

RECOGNITION of co-operative marketing agencies to a degree hitherto unknown in agriculturo-legal history is one of the principal features of the Farm Relief Act. The Farm Board has held that a co-operative, to be effective, should be powerful enough to exercise "100 per cent control," or as near that as may be, of the products of its members. It has brought about consolidations of existing organizations where two or more were competing in the same field, as, for example, the Florida citrus fruit growers.

Recently the Farm Board, through C. C. Teague, president of the California Fruit Growers' Exchange, suggested that the two principal citrus shipping groups in California—the California Fruit Growers' Exchange and the Mutual Orange Distributors—hold a conference looking toward consolidation. The Exchange agreed to the proposal but the Distributors refused flatly to consider the matter. In their reply the latter stated that although they were heartily in favor of "100 per cent co-operation," they were distinctly opposed to "100 per cent control," whereby healthy competition within the industry would be prevented.

On the record of accomplishments for the year ending Nov. 1, 1929, it is understandable why the Mutual Orange Distributors refuse to consolidate with the larger organization. They are competing successfully with a similar group controlling seven times as much fruit and doing it at a slightly lower cost. True, they

are perhaps benefiting somewhat from the sales activities of their larger competitor—a situation that occurs often in all industry.

However, this does not lessen the validity of the general argument, and it raises the question as to just what the purpose of a farm co-operative may be. Is it not to control and improve marketing conditions in the product handled, to the end that price fluctuations may be eliminated as far as possible? Can it function satisfactorily other than by providing a steady flow adjusted to the demand from the several centers of distribution? If this be the case, would not "100 per cent control" be the most effective way of doing it? Frequently not more than 10 per cent oversupply will shrink prices by as much as 50 per cent. Although the California Fruit Growers' Exchange controls 75 per cent of the citrus shipments, the remaining 25 per cent, improperly allocated, could easily turn a potentially profitable year to one of actual loss. Does the slogan "100 per cent co-operation but not 100 per cent control" mean anything? Does not the one imply the other?

Seaweed: a Virgin Field for Research

TO MOST OF US the term "seaweed" implies something that is essentially useless; a plant that clutters up and renders disagreeable what would otherwise be a pleasant beach; something associated with the "doldrums," "horse latitudes," and the Sargasso Sea. Yet this same useless weed was the earliest source of iodine and bromine, and, until overshadowed by other sources, furnished employment for thousands of "kelp" burners on the European coasts. During the World War seaweed again came into its own for a time as a source of such varied products as potash, acetone, esters of acetic, propionic, and butyric acids, iodine, and alginic acid.

As a principal or auxiliary food material, seaweed is eaten by many Oriental peoples and inhabitants of the Pacific islands; the Hawaiians are said to utilize over seventy species for food. A few species, chiefly Irish moss, dulse, and laver, are consumed as food in Europe and to a slight extent on our own Atlantic coast.

Agar probably is the best known product of seaweed, though its use as a food product has not been studied to the extent that its probable value warrants. One company has pioneered in the production of this product in the United States in the face of a virtual monopoly by Japan. As is ever the case with pioneers in any business, its path was not strewn with roses but was marked by discarded machinery, the rejection of apparently excellent ideas, and at times failure rather than success loomed in the offing. Finally, however, a successful process was worked out and its operation is described elsewhere in this issue.

Our interest in the American manufacture of agar has several aspects. Not only is it an example of overcoming obstacles in the path to success by the use of relatively novel processing but also it introduces to food manufacturers a, to them, relatively new auxiliary food colloid of useful and healthful properties. At the same time, and perhaps most important of all, it suggests that among the vast vegetable resources of the sea there may be other raw material well worth the time, trouble, and expense of investigation for future use in the human diet.

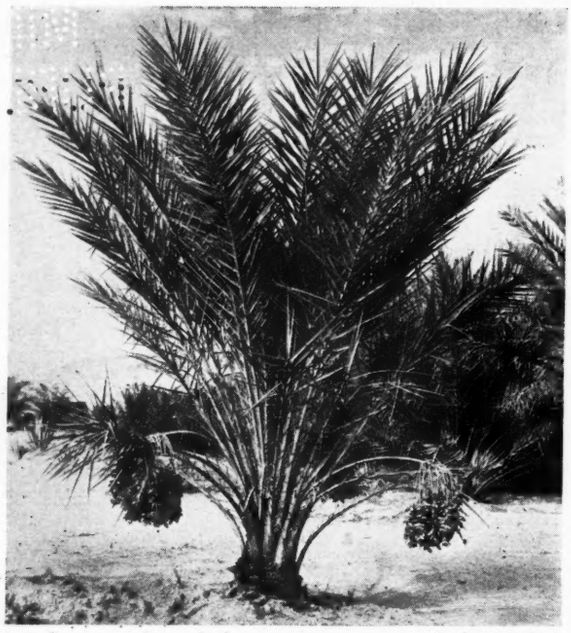
Is Food Packaging Different?

LAST WEEK at a dinner with the heads of one of the largest food manufacturing companies the vice-president in charge of sales was indulging in a little pipe dream for the benefit of the vice-president in charge of production. "But," he concluded, "every time I give you a bright idea that will save money, you turn it down flat."

"I'll give your bright idea a six months' trial on the condition," replied the vice-president in charge of production, "that all spoils and returned goods shall be charged to the sales department plus the handling charge, and that we debit your department with the increased factory overhead due to decreased production that will be absolutely certain to follow if we follow out your bright idea of the right way to pack our goods."

Doesn't this conversation answer that perennial question, why is packaging of food on a basis different from packaging in other lines—knit goods for example? Food can spoil from any one or more of several causes; it can become stale, damp, moldy, buggy; it can ferment, dry out, crumble, wet, freeze, thaw, and what-not. Many things can happen to packaged food long after it has left the manufacturer's hands, practically all of which can be avoided to greater or less degree by proper packaging, and it is in the production department that adequate specifications for proper packaging probably always will originate. Certainly they will originate in the production department as long as spoils and returns are charged back to that department.

Products other than foods, of course, are subject to a certain amount of deterioration in the channels of trade; otherwise there would be little occasion to package them. Foods, however, have the possibility of more things happening to them than almost any other article of commerce—mishaps and changes that will render them unmerchantable or unfit for consumption. In specifying what kind of packages are to be used and how they shall be used, the production man is the important factor in food manufacturing. Size of package and decoration of label, only, are in the province of the sales department.



—*Algerian Govt. Photo*

DATE PALM of the Deglet - Noor variety

"FINGER OF LIGHT" is the meaning of name given to the luscious dates which the native holds

—*Algerian Govt. Photo*

AFRICAN DATES—

The Present Status Of an Ancient Food

By O. C. ZILISCH
Paris, France

THE HISTORY of dates and the date palm goes back to the beginning of time. The palm of the Bible undoubtedly was a date palm. Wherever it has grown, it has been the subject of legend upon legend. Many a Mussulman poet has been inspired by the sacred tree, and it is related that the prophet himself said: "The date palm is your Aunt (the sister of your father Adam). Surround it with every care." The legend has it that when God formed the body of Adam, a bit of the earth adhered to His fingers. This earth He rolled between His hands to form the trunk of the date palm.

This is more than mere poetic fancy to the native of the Algerian Sahara, for the tree furnishes what to him is a complete food. The nature of the climate in this part of the world makes it practically impossible to rely upon any vegetation other than the date palm and the fruit trees and various kinds of vegetables raised under its protecting shade. It is only logical, therefore, that the date trade among the natives in itself assumes huge proportions each year. In fact, most of the dates grown there never see a foreign land of any kind, and this fruit, considered so nourishing for man, is used also as food for animals.

The palm is essentially a tree of the oases of southern Algeria, although it is found also in certain districts of Tunis and Morocco. Desert regions are favorable to it, as it needs constant heat together with an absolutely dry atmosphere. In order to be at its best, it needs subterranean or running water to give life to its roots. According to a saying of the Arab, the date palm must have its head in fire and its feet in running water.

The running water that the date palm requires is furnished either by a natural subterranean source or by irrigation made possible by the fact that a number of oases in the Sahara have deep, full-flowing artesian wells. A plantation is established by obtaining shoots, or *djebars,* originating from the female date palms that have already produced fruits of the desired quality. Growers of the date palm have always recognized that the use of seedlings does not produce satisfactory results. The shoots are usually obtained during the spring, and this must be very carefully done to assure success. These shoots are then planted in the same way as one plants a slip, or cutting, at a distance from one another varying from 8 to 10 meters. Plantations with trees too close together produce a fruit less fine in quality and reduced in quantity. An Arabian proverb makes one palm say to his

neighbor: "Spread your shade and I will produce alone for you and for me." After the shoots have been planted there is nothing further required except to keep them well supplied with water.

The date palm is dioecious, having the male and female flowers on separate trees, although it is practically impossible to distinguish the two sexes when the date palms are not in bloom. In order to provide for the fecundation of the female, there is raised and cultivated on each plantation a certain number of males, known as *doukkar*. In the Djerid district, for example, it is estimated that it is necessary to have 1 male date palm in order to fecundate 25 female palms. Other sections find that 1 male palm is sufficient for 100 female trees. The natives say that there are several kinds of males, differing in the abundance or the strength of the fecundation powers of the pollen, as well as according to the period of production, which must coincide with the opening of the flowers of the female palm. However, the pollen may be conserved over a long period of time, from one year to another, if kept sheltered from the wind and from dampness.

The date palm ordinarily begins to fructify at the age of 6 years. It is not really considered adult, however, until after 12 years, and, in some instances, not until after 15. Each year, during the month of April it is necessary to proceed with the fecundating process. The female palms are then in flower, and with the aid of a small branch of flowers taken from the male palm, rich in pollen, the female palm is impregnated. Clusters of flowers do not appear at one time upon a female tree, but make their appearance gradually, and each cluster is fecundated as it appears. The flowers themselves grow in groups, but once they have been impregnated with pollen, only one remains to produce fruit, the others of the group falling. When the flowers have not been fecundated the ovaries take on little development. The fruit, once formed, develops during the summer, and matures in the month of October, although this period often extends into November, December, and January, depending upon the variety of date grown. A date palm reaches its maximum production at the age of 40, and maintains its fruitful state over a period of 40 more years. In certain instances this period may be extended beyond this figure, depending upon good conditions as to soil and care exercised.

In order not to exhaust a date palm, and to be assured of full-grown fruit, it has now become customary to cut off some of the bunches of dates whenever it appears that the crop will prove too abundant for the tree. Everything possible is done to protect the finest clusters of fruit by ridding the palm of those not so promising or which might retard the development of the good fruit. Artificial maturation also is resorted to, so that the fruit obtained may be of a consistent standard of quality and aspect. As one of the accompanying illustrations clearly shows, the maturation process very frequently consists in placing a bunch of dates in a bag while the cluster is still a part of the palm. All of the systems employed to produce a mature fruit artificially, either on or off the tree, are based upon the principle of furnishing heat and humidity to hasten the ripening of the dates.

There are about 150 different varieties of date palms in existence. The 3 important kinds grown in southern Algeria, however, are the so-called Ghars, Degla-beïda, and Deglet-Noor, and each of these varieties is distinctive as to taste, color and size. They constitute a veritable fortune to the owners of date palms in Algeria. The

ANCIENT DATE-PALM PLANTATION near Biskra, Algeria

Algerian Govt. Photo

names of these species also are picturesque, designating the characteristics of the dates they represent. Ghars, for example, means robust. The fruit is large, and grows best in the oases of the Algerian Sahara. Its color is a pale reddish brown. It is literally gorged with fluid honey that runs from the fruit in a sirup when it is broken during the mature stage. This so-called "date honey" is collected before pressing the Ghars dates in goat hides and transforming them into what is known as date "loaves" for the caravans. When pressed into loaves, the Ghars date has a reputation for good keeping qualities over long periods.

Degla-beïda, or "white finger" date, is a dry fruit. The dates under this category are large in size, finely and regularly formed, with a glossy, smooth skin. They retain their shape admirably, and their color is a yellowish white on the dorsal side and brownish red on the ventral surface. They have a nut-like flavor, and are held in high esteem by the Ksourian Arabs and shepherds, because of the nourishment they embody. The Degla-beïda does not have the keeping quality of the Ghars. As it is comparatively rapidly attacked by worms, it is difficult to conserve the Degla-beïda from one year to another. Another dry date, known as the Kentichi, is very much sought after by the natives, particularly in the Oued Rhir district. The Kentichi is a very small date with a high sugar content, and is considered very nourishing.

The Deglet-Noor date, known as the "finger of light," because of its transparency, fine texture, amber color and form, is the variety that enters most into export trade. It is of medium size, except in the case of the large Souf variety. Noted for its delicacy of flavor, it is by far the most popular date in Europe and other countries. It is easily conserved if the proper care has been exercised to gather the fruit when absolutely ripe. This type of date usually should be subjected to a slight drying process before being packed in cases for export, this precaution assuring a satisfactory keeping period. More than 100,000 quintals* are exported annually.

IT IS to be regretted that this excellent fruit is not always prepared and presented with the proper care. However, up to the present time the production is below the demand, so that none of the fruit remains unsold. Some of the growers of the Deglet-Noor variety, both natives and foreigners, are going into the matter of preparing this type of date in a thoroughly modern manner for export trade. Progress in a number of instances is rapidly taking place, according to Algerian government officials, and sanitary measures of the most conscientious kind are now being observed. This wholesome state of affairs, naturally, is reacting favorably upon the export figures.

Packing dates for export is controlled by the type of dates to be handled. The Ghars variety, for example, upon being relieved of the fluid honey with which they are filled, are pressed and placed in sacks or goat skins. This packing is known as a "loaf" of dates among the natives. The Deglet-Noor dates, on the other hand, because of their dry character, are packed in cases. Only fully matured dates are used, and those of the Deglet-Noor variety, as a rule, are subjected to a drying process, in order to assure satisfactory preservation. Transportation for the most part is by means of caravans.

The number of date palms in Algeria is constantly increasing. Statistics for May, 1928, give the information that at the beginning of 1927 there existed in Algeria 6,721,000 such trees, of which 5,250,000 were in full production at that time. The Ghars variety comprised 2,801,000 trees, producing 500,000 quintals of fruit, all consumed by the natives. The 400,000 quintals of dates of the Degla-beïda and Kentichi varieties also remained in northern Africa, or were sent to central Africa. The Deglet-Noor palms produced fruit to the amount of 250,000 quintals, the number of trees represented being 760,000.

Due to a colonization and development program extending over a long period of time, the French have succeeded in bringing Algerian date-palm plantations to a high state of productivity. In 1856, in the district of Touggourt, for example, there were 400,000 date palms. In 1913 there were 1,500,000, and in 1921 there were 1,700,000. No longer ago than 1901-02 the export figures for dates did not exceed 21,000 quintals. In 1921 Algeria exported 107,917 quintals, worth 23,741,000 francs. In 1927 the figures were about the same, namely 108,463 quintals, with a sales value of 54,232,000 francs. The autumn of 1927 will be remembered as one of the worst for the production of dates ever experienced in Algeria, due to adverse climatic conditions. This is borne out by the fact that in 1928 Algeria exported 129,330 quintals of fresh dates, with a value of 71,138,000 francs, as against the 108,463 quintals, worth 54,232,000 francs in 1927, and 119,000 quintals, valued at 59,665,000 francs in 1926.

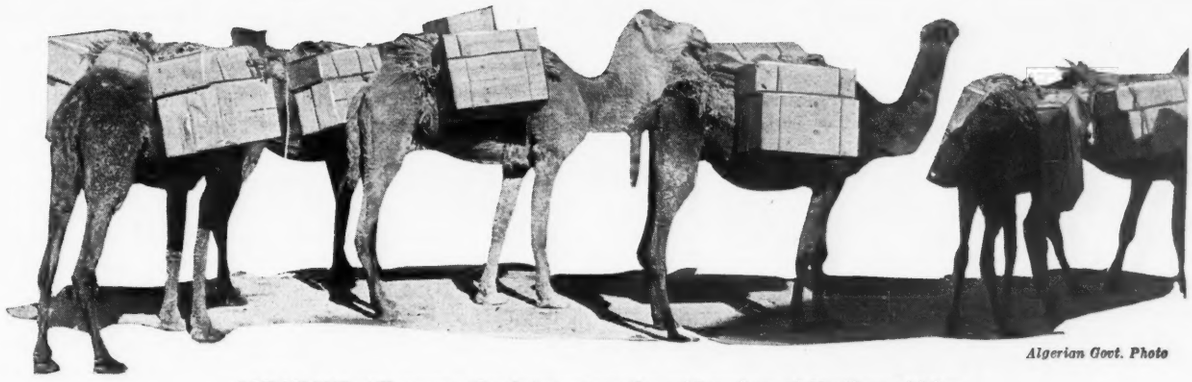
Naturally, France figures most prominently in export trade on dates from Algeria. In 1928, according to recently compiled statistics, it received 118,329 quintals, valued at 65,086,000 francs, and only 11,001 quintals, valued at 6,052,000 francs, went abroad. Of course, a number of the dates going to France are repacked in Marseilles, for example, and prepared for export in attractive packages. To the export figures quoted above must be added the dates destined for distillation purposes. The actual amount exported for this use is not available, as, apparently, the Algerian customs officials do not give these figures out regularly or in any tangible form. It is estimated, however, that in 1928 about 15,554 quintals, valued at 876,000 francs, were taken by the distilleries of France and other countries.

In addition to the dates grown for export trade, there are approximately 850,000 quintals, valued at 50,000,000 francs, at least, which remain in the country and are consumed by the natives. The varieties referred to are the Ghars, Degla-beïda, Tilemsou, Kentichi, and others. During each winter the nomads of the South, with their camels, bring these dates to the North by caravan. Some

RIPENING is hastened by inclosing the bunch of dates in a paper bag

Algerian Govt. Photo

*1 Quintal (metric) = 100 kilograms or 220.4 pounds.



Algerian Govt. Photo

CARAVANS still convey the dates across the arid regions of Northern Africa

of these dates find their way to Spain, where they are used by the distilleries for the production of what is considered a fine grade of alcohol. Dates not carried to the Northern districts of Algeria are, of course, employed as food by the natives of the Sahara, who prize the date, or *temra,* as it is called by the Arabs, very highly.

The food value of dates is, in fact, considerable, the finer varieties having the following composition: Pulp, 85 per cent; stone, 15 per cent. According to M. Balland, in his work on the dates of Algeria and their value as a food product, the pulp and the stone of the date are analyzed as follows:

	Pulp, Per Cent	Stone, Per Cent
Water	25.00	13.00
Nitrogenous matter	1.70	4.48
Fats	0.29	5.00
Sugars	49.10	1.25
Extractive matter	18.46	64.27
Ash	1.90	1.00
Cellulose	3.55	11.00

From the foregoing it will be noted that the stone of the date, which is, in reality, a veritable albumen-containing grain, has actual food value. The custom of the Arabs to feed the stones of the dates, after having been softened in water and brought to the germination stage, to their camels and goats is justified by the fact that the stones are sufficiently rich in nitrogenous matter and hydrocarbons. As for the pulp of the date, so agreeable to the palate, there is no question as to its nutritive qualities. Dates like the Bassorah, for example, contain about 60 per cent sugar, as against 16.40 per cent water. The Ghars date also is extremely rich in sugar content, as already pointed out. This explains, of course, why the date is so widely used in the production of alcohol.

In Algeria, the services rendered to the native population by the date palm, other than furnishing food and a profitable export trade, are many. The date palm is the sacred tree of the Arabs, and the natives say, for example, that camels going into a plantation of date palms could find there complete equipment of a bridle, *haouia,* two *chouaris* (sacks), and even, they add naïvely, a stick to make them walk. The leaves of the date palm are woven into hats, baskets, straw mats, fans, and even receptacles for water. In the Djerid district, date palms serve in the making of ceilings, cradles, ribs of tents, and, arranged in parallel fashion, they constitute the means for making a fine mattress. With the thorns of the palms are made combs for the carding and weaving of wool; the stipe, or trunk, is used to the exclusion of all other wood by the woodworkers or carpenters in the building of houses and furniture. It has been found that palms with tap-roots furnish the native with a wood that is much more resistant and of finer grain than the others.

The textile matter which encompasses the base of the palms, and which the French call *bourre,* or flock, and the Arabs *liffa,* furnishes excellent cord, material for mattresses, mats, and *chouaris* for dates. The peduncles of the *régimes,* or bunches, are utilized in the manufacture of certain coarse cords; those of a special type, known as *gundi,* are used by the dye trade. The twigs upon which the dates grow are sometimes given to the camels as food, and also are frequently employed for making brooms, and matches that may be lit by rubbing one against the other. Notched in a certain way the date palm produces, according to the method of extraction used, a fermented or unfermented drink known as *lagmi.* In short, all parts of the date palm are employed in one way or another.

When too old to produce any more fruit, the date palm must cede its place in the plantation a younger one. When it is cut down the date palm offers a last gift: its heart which the natives call *djoumar,* and which they prize highly as an edible.

Date palms producing the Deglet-Noor type of fruit are found to be most productive in the so-called Algero-Tunisian triangle, Biskra-Touggourt-Ouargla-Tozeur. The demand for this kind of date is far from being satisfied, despite the fact that a fairly large number of trees of the Deglet-Noor variety have been planted in Egypt, California, and northern Australia. Although some of the date palms in California are giving satisfactory results, it is held by many authorities that they do not furnish as high a quality date as the Deglet-Noor of the Algerian Sahara.

In Tunis, as in Algeria, it is in the Southern territories of desert climate that the date palm is grown. The palms best known for the quality of their fruit are those of the Djerid district (Tozeur, Nefta, El-Oudiane) and those of the Nefzaoua. Date palms in the Gabès, Djerba, Gafsa, Médénine, Zarzis and Foum-Tatahouine sections, because they are either too close to the sea or exposed to cold winds, do not produce any fruit for export, the quality being such that they are all consumed by the natives.

During the past few years, however, the situation has improved, and at the present time there are approximately 2,600,000 date palms growing in Tunisian territory. About 1,700,000 of these are in full production. Of these again only 70,000 can be said to produce dates of a quality sufficiently high for export trade, and it is from the oases of the Djerid and Nefzaoua districts that this type of date is drawn.

In 1927 Tunis exported 20,878 quintals of *degla* dates,

as compared with 19,125 quintals in 1926; 32,086 quintals in 1925; 16,224 quintals in 1924; 12,875 quintals in 1923; 19,412 quintals in 1922; 14,784 quintals in 1921; 12,830 quintals in 1920; 15,205 quintals in 1919, and 11,680 quintals in 1918. The value of the 1927 exports was 12,527,000 francs, an increase over 1926, the value of exports that year being 9,563,000 francs.

The countries importing the first quality dates from Tunis are many, but France and Italy purchase the largest quantity. Some of these imports are redirected to other parts of the world, as is the case with dates imported into France from Algeria. Ordinary domestic-quality dates are purchased in large quantities from Tunis by buyers in Algeria.

Dates in Tunis usually are gathered some time between Oct. 25 and Jan. 15. During hot and dry years the maturation period may be considerably in advance of other seasons, such favorable conditions bringing with them a satisfactorily high price, because the dates can be placed upon the market just before the Christmas and New Year holidays.

Tunisian dates are sold for export in cases weighing approximately 30 kilograms gross, in small cases weighing about 10, 5, or 3 kilograms gross, and in cartons attractively presented, weighing from 1 to 2 kilograms. There are, of course, a number of traders in Tunis who serve their clients in other countries by giving them special packing of any kind required. These dates are free from duty when entering France, although there is a direct tax placed upon all dates leaving Tunis, this tax being known as *canoun*. This tax is based upon a certain amount per tree, and varies according to the various regions, being higher in the Tozeur district than in the Gafsa section, for instance.

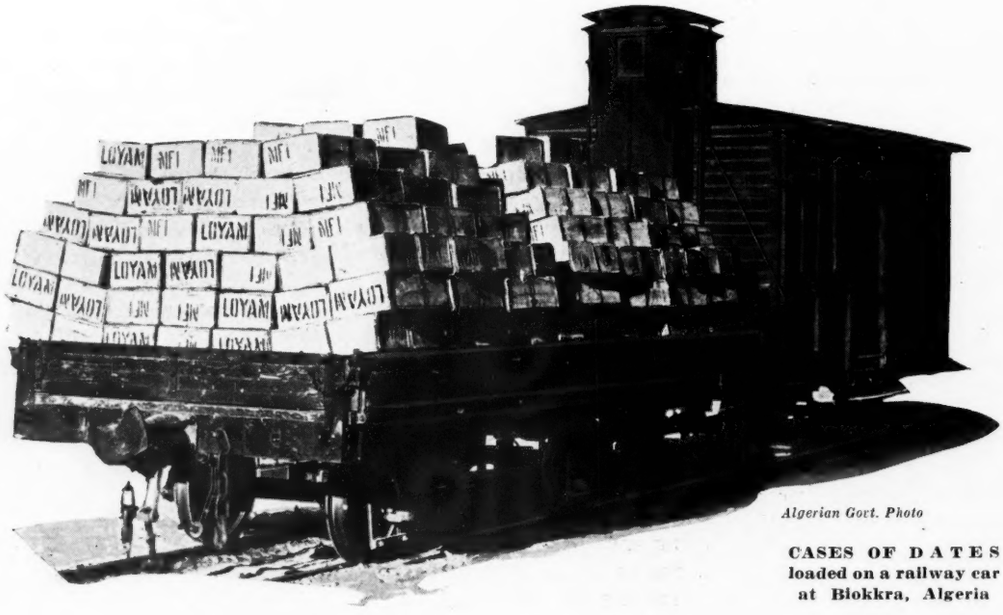
That dates going into Marseilles are redirected from there by enterprising traders is readily understandable in view of the fact that they come in duty free. In fact, those concerned in Tunis apparently are very much wrought up at the present time about the entire question, and are, it is said, urging the people of Tunis to do everything within their power to place their products upon the European market in a way to prevent attempts at unfair trade practices on the part of the buyers in Marseilles.

In Morocco, on the oases of Marrakech, the date palm does not produce a fruit of any recognized quality like the Deglet-Noor of Algeria and Tunis. There are in existence several hundreds of thousands of date palms, but their productivity cannot be counted upon, as the autumns frequently are humid, preventing the dates from reaching a satisfactory stage of maturity. Even during the better years, the palms of Marrakech do not give any more than, perhaps, 30 to 40 kilograms of fruit per tree, and during off years the yield diminishes to anywhere between 10 and 15 kilograms. The Bou Feggous and Bou Sekri are the most highly esteemed varieties, but they are very difficult to handle, because of their delicate texture.

Dates of medium or ordinary quality are consumed by the inhabitants of Morocco, as well as by the animals. The fruit of better standards of quality serves as a medium of exchange and also is exported. Included in this category are dates from the basin of Oued Draa; those of the basin of Ziz-du-Guir; and those of the oases situated farther south than Draa. The comparative insignificance of the export of dates from Morocco is attested by the figure for 1927, which was 15 quintals.

The natives of Morocco produce what is known as "date honey," used by them in cake baking. Dates of excellent quality are pressed until the sirup, or honey, in the fruit has been completely extracted. This product is especially sought after and employed by the inhabitants of the Draa and Adrar districts.

It is in the southern part of Morocco that the best results are achieved with the date palm. In fact, the plantations in the districts of the South produce a consistently high quality of fruit, among which are the Tafilalet, Oued Todra, Oued Ferkla, and Oued Ziz. On the Algero-Moroccan frontier the oasis of Figuig alone numbers plantations totaling approximately 200,000 date palms. The varieties produced by these trees include the Majhoul, Bou Sekri, Hafs, Bou Feggous, and Khalt. For exportation, the Majhoul or Mejhhoul date is the more highly favored.



Algerian Govt. Photo

CASES OF DATES
loaded on a railway car at Biokkra, Algeria

GAS-FIRED OVENS

A Significant Feature of Modern Bread Making

By J. B. NEALEY
American Gas Association

THE STORY of any modern bakery with a capacity approaching 300,000 loaves a day is necessarily of interest, but when such a bakery stands as the culmination of the wealth of experience gained in the operation of 50 plants in 39 principal centers of population—the experience and research of the second largest of our national baking chains, the General Baking Company—it becomes truly significant. The new Philadelphia bakery of the makers of Bond bread is such a plant.

Important among the results of this culmination of experience was the decision to bake by gas in this new shop. It was a decision based upon work of an experimental nature in other plants extending over several years, and determined upon the grounds of efficiency and comparative cost.

The present capacity of the new plant is in excess of 285,000 loaves a day, with considerable room for further expansion. The building has 3 stories and a basement, is of concrete and steel with floors and walls of white tile and contains floor space of nearly 6 acres. Light from spacious windows on all 4 sides, operators in spotless white uniforms, analyses of samples from every shipment of raw materials received, and the fact that human hands touch the bread and its ingredients as little as is compatible with modern bread making, all contribute toward high quality and purity of product.

In the basement, provision is made for blending the 4 brands of flour used. This is accomplished, together with the accompanying sifting and cleaning, in a unit about 50 feet long, 10 feet high, and 5 feet wide, the larger part of which is a storage bin. The feed bin is at one end and has 4 motor-driven screw conveyors, operating at variable speeds in order to furnish proper proportions of the several flours employed. The lower screw moves the blend forward to a bucket elevator that lifts it and discharges it to the sifters. From here it drops into a storage bin holding 400 barrels—80,000 pounds. The blended flour is moved forward by another screw conveyor from this bin to a bolting machine for further aëration, and a bucket elevator then raises it to the third floor, where the mixers are located. A smaller cleaner and bin for rye flour is also provided in the basement.

Five gigantic mixers, driven by individual motors, are aligned on the third floor, each served by a flour hopper and water tank. Flour is distributed to the hoppers through a system of 3 screw-conveyor conduits, immediately overhead, which bring it from the bucket elevator. One of these conduits is for wheat flour, another for rye, and the other for possible return of any excess flour. Take-off tubes are located over each hopper. Safety measures here include a device which cuts out all control switches except when mixers are upright.

Blending, sifting, and delivery are synchronized with mixing by remote control located at the mixers. The operator sets the correct weight on the hopper scale, closes a switch that starts the equipment motors in the basement and those driving the delivery conveyors, and tips on end the balanced shutter in the flour-feed pipe. The flour then pours into the hopper until the weight tips the scale arm. This opens the circuit, causing all the motors to stop and the shutter in the feed opening to close. The opening of a shutter in the bottom of the hopper then allows the contents to drop into the mixer.

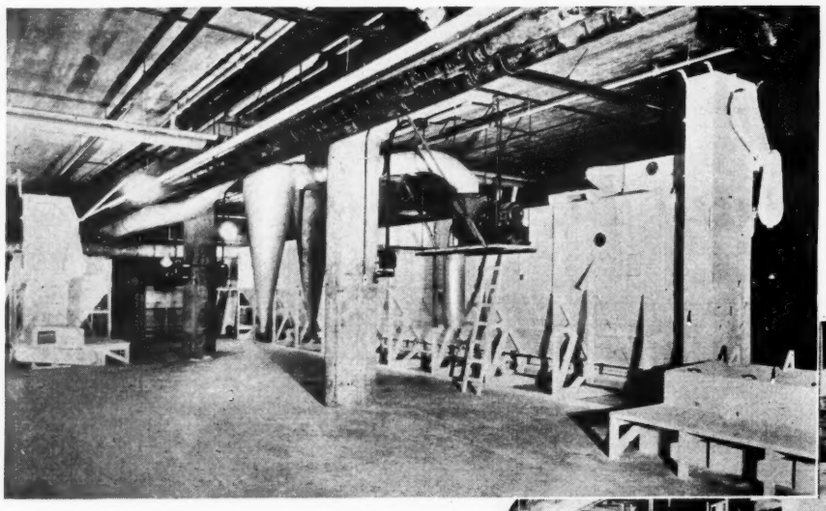
The ingredient room is directly adjacent. Here a man with a truck holding 15 large batch cans passes progressively along a line of bins and weighs out the ingredients, which are distributed to the mixers and dumped in with the water and flour. Yeast is added directly to the mixer from a motor-driven emulsifier.

THE motors that rotate the mixers are then started, and are stopped automatically when the dough has risen to a predetermined temperature. This is accomplished by a dial with two hands, one of which is set at the proper temperature. Rising temperature causes the other hand to move around the dial, until contact with the first hand interrupts the electrical circuit and stops the mixer.

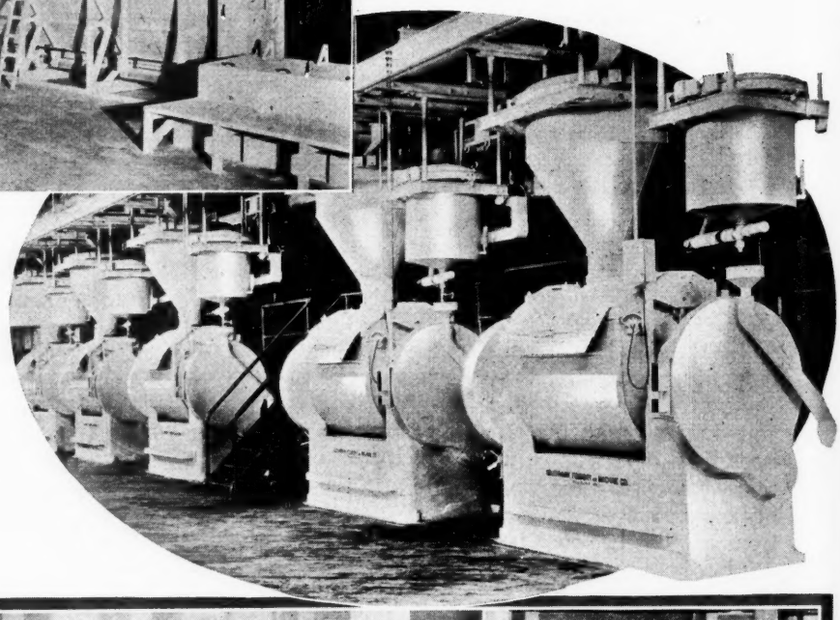
To provide a proper mixing period, with the consequent maximum development of the dough, the mixers are water jacketed and cold water circulated around them. The dough is then dumped into long troughs and allowed to stand for several hours, with the customary cuttings and manual punchings to release the excess gases of fermentation. A humidifier and a system of distributing pipes keep the atmosphere in the mixing and fermentation room at the proper relative humidity. The temperature also is automatically maintained at the proper degree for best fermentation.

The fermented dough is dumped through chutes to the hoppers of 3 motor-driven scaling machines on the floor below. These machines cut pieces to loaf weight, 6 at a revolution, and drop them to belt conveyors serving the balling and rounding machines. At this point, they

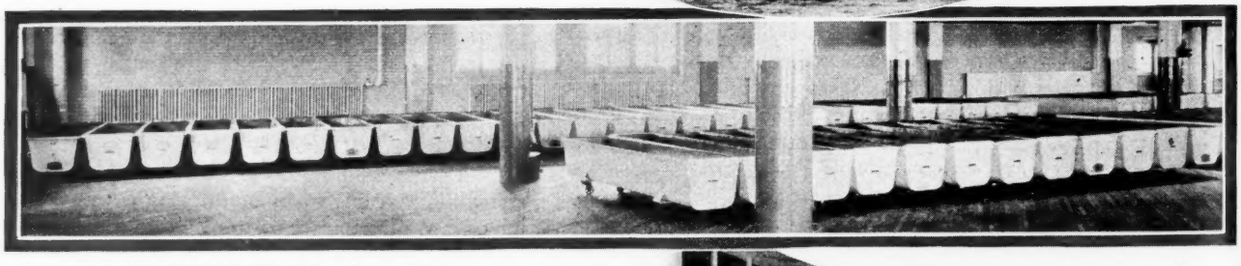
Straight-Line Pro
In Modern Bre



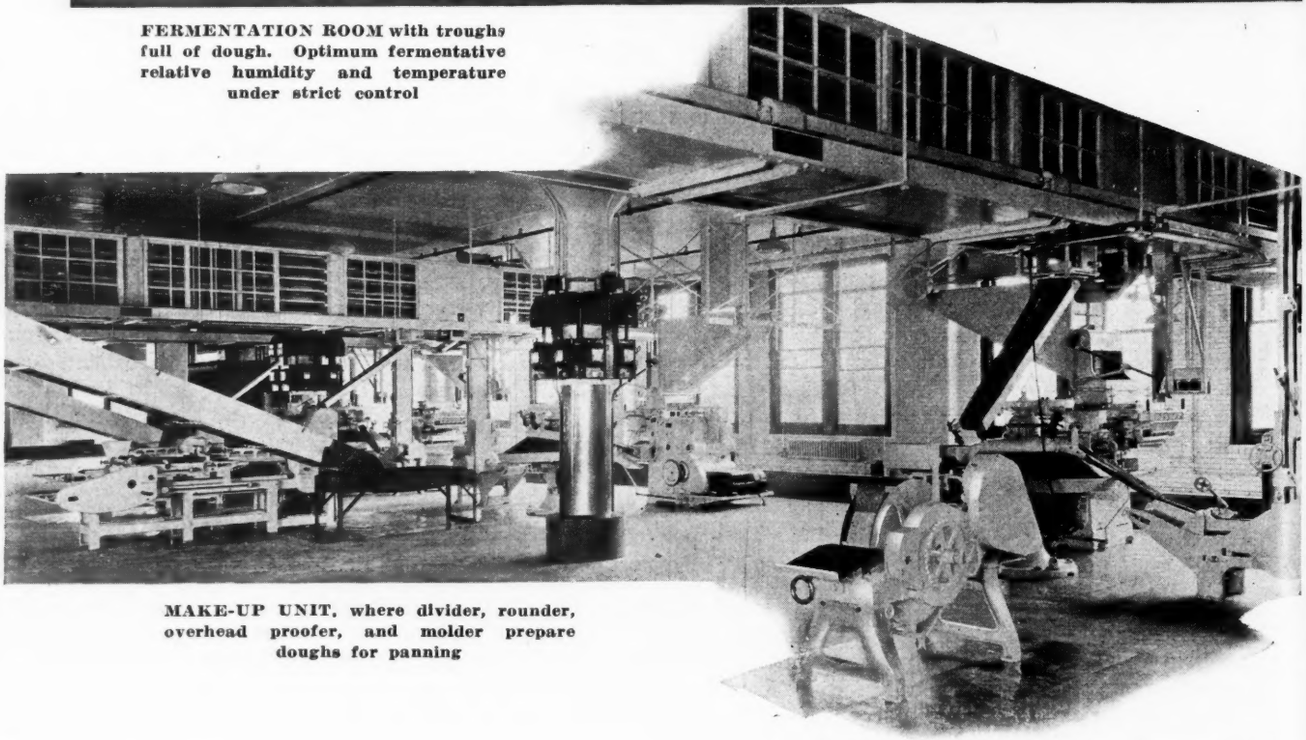
FLOUR, stored—1,000 barrels at a time—in this basement, is here made into a 4-part blend, and cleaned and aerated by repeated siftings, the feed bin being at the right-hand end of the 50 feet unit



DOUGH MIXERS, mechanically operated, water-jacketed, with stop switches automatically controlled by temperature of dough, as well as position of mixer. Blending unit in basement controlled here

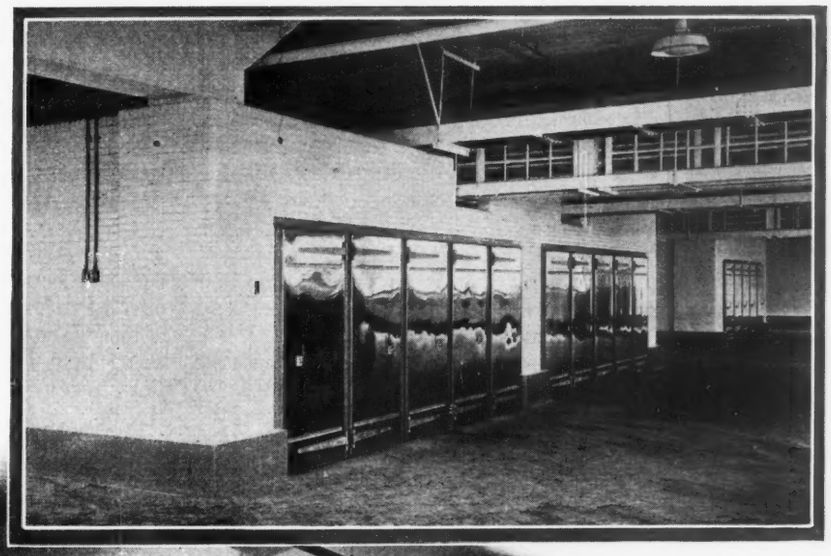


FERMENTATION ROOM with troughs full of dough. Optimum fermentative relative humidity and temperature under strict control

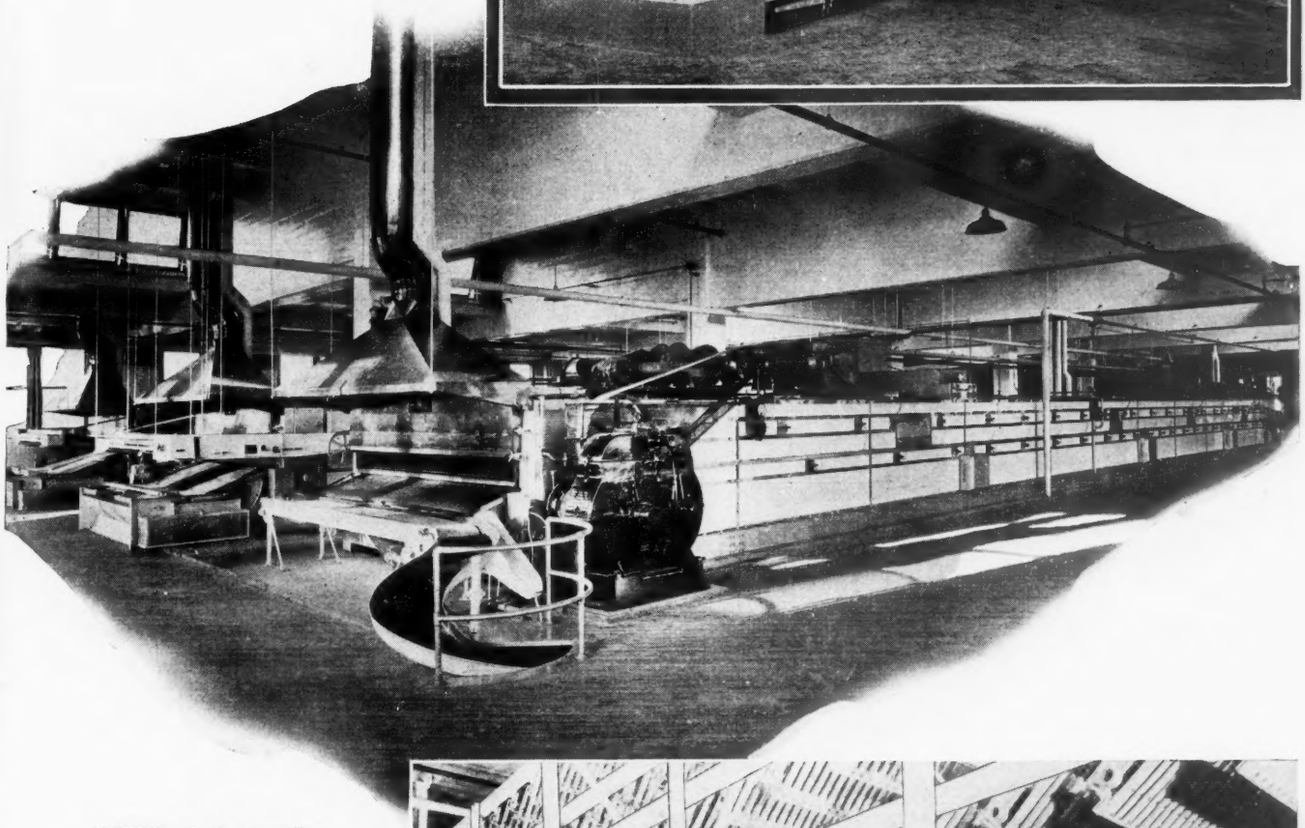


MAKE-UP UNIT, where divider, rounder, overhead proofer, and molder prepare doughs for panning

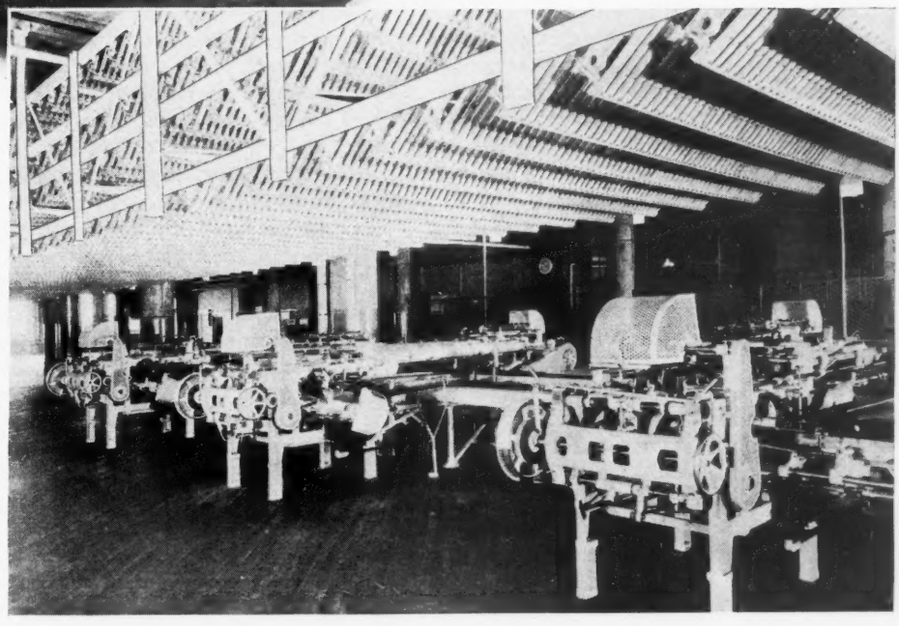
Line Production dern Bread Making



FINAL PROOFER for use with racks of panned doughs, ready for the oven. Humidity and temperature carefully controlled



OVENS, of the traveling-hearth type, indirectly fired with gas, with 8 automatic temperature control stations



COOLING RACKS, traveling overhead, take baked loaves from oven (on floor above) and deliver, fully cooled, to automatic wrapping machines

are delivered to an elevator conveyor consisting of two vertical, parallel canvas belts, which lift them to long proofing boxes suspended from the ceiling.

Each proofer is essentially an inclosed cabinet 90 feet long in which travel 5 endless canvas belt conveyors, one above the other. The balls of dough drop on one end of the upper belt, travel to the other end of the cabinet and then fall to the belt below. Reversing their direction, they then travel back and drop on the third belt, and so on, until they fall from the bottom belt directly into a molding machine, which forms them into loaf shape. These machines and conveyors all have individual motor drives, so synchronized that one unit —cutter, rounder, proofer, molder—will produce 90 loaves a minute.

The molders also put the shaped pieces of dough into pans, each loaf in a separate pan, 5 pans at a time. The pans are then placed on racks equipped with casters, and are rolled into proofing rooms—one for each unit. These rooms are of brick and provided with a humidifier which maintains correct humidity and temperature.

THE racks of bread are pushed out the other side of these 3 rooms directly in front of 3 traveling-hearth bake ovens, each 110 feet long, 8 feet high, and with a hearth width of 10 feet 2 inches. These are indirectly fired with long gas-pipe burners entirely enclosed in U-shaped tubes of stainless steel. Burners and tubes are built into one side of the oven, projecting transversely across the oven. A burner occupies one side of each tube, the other side being used as a return duct. This serves to radiate additional heat, as well as to convey the products of combustion from the outside of the oven to a stack.

The walls of the ovens are of magnesia block, 11 inches thick on the burner side and 8 inches on the opposite side. They are lined inside with rust-proof metal sheets and sheathed with heavy, opaque, white gloss plates, stainless-steel strips supporting the panels. The crown is substantially of the same construction. The supporting steel members are outside the oven, the only inside steel work being for the support of the track used by the conveyor chains. There is an opening at each end equipped with a counterweighted door, small inspection doors being found at intervals along the side. In addition to their efficiency, the ovens present a most attractive appearance.

The traveling conveyor constitutes the hearth of the oven, the gas burners being so located that approximately one-third will fire above and two-thirds below. They are manifolded 6 or 8 to a header, and there are 8 headers located along one side of the oven. In this way practically any heating condition may be obtained in any portion of the oven; furthermore, it may be automatically maintained at the correct temperature.

Between 2 of the ovens is located a panel with 16 temperature control instruments, 8 for each oven, or 1 for each section. Localized control is thus afforded for both top and bottom of 4 stations, termed "feed," "middle feed," "middle delivery," and "delivery." In operation, the dials are set at the desired figure, and the required temperatures are maintained automatically in the several sections of the oven. Four indicating pyrometers with multiple-point switches are used to check temperatures. Thermocouples in the oven, and motor-operated valves on the gas-feeder lines, complete the temperature-control equipment.

Complete combustion is obtained by mixing air with the gas in correct proportions. This is accomplished by an injector on each header and is maintained automatically, regardless of the flow of the mixture, by means of diaphragm valves on the gas and air lines supplying the injector. Gas pressure in the city mains usually runs from 3 to 7 inches water-column, but if the pressure is higher, pressure-reducing valves are used. Air filtered by a blower located on top of the oven is supplied at a pressure of from 4 to 6 pounds.

Various safety devices are included in the combustion equipment, including a special spark plug that gives a constant succession of sparks for each burner. If the current to a spark plug fails, it opens a circuit that closes a master safety valve in the gas supply line, the valve being held open by a solenoid only so long as current flows. If the gas pressure drops or the air blower stops, the master valve closes. Practice has shown that, even if the tubes were to become filled with an explosive mixture, there would occur nothing more harmful than a popping noise—like that in the muffler of an automobile.

Steam is blown into the charging end of the oven through a series of nozzles. Five outlet ducts, with dampers for regulating the oven atmosphere, are provided at different parts of the baking chamber.

The traveling conveyor consists of 2 endless chains, one on each side of the baking chamber. Between them are suspended steel plates 9 inches wide and 10 feet 2 inches long. These plates form a solid hearth, and yet allow the required flexibility for turning around the sprockets at either end for the return travel. The conveyor is motor-driven through a reduction gear train and a variable-speed transmission. The 5-horsepower motor used for this purpose is placed on top of the oven. A tachometer shows the rate of conveyor travel.

TWO of the ovens are used mainly for pan bread, the third for rye, French bread, and other types of hearth-baked bread that require no pans. Two ovens are maintained at temperatures of from 450° to 500° F., the other less than 300° F., the purpose being to bake the bread as slowly as is possible in order to bring out the flavor of the wheat.

Operators place the pans of unbaked bread on the loading end of the conveyor. Others remove the baked bread from the discharge end of the oven and dump the loaves into chutes which carry them to cooling conveyors on the floor below. The pans are placed on a short crossover conveyor which dumps them onto a long slat-type conveyor. Here they are carried the full length of the oven and over the proofing rooms to the mechanical greasing machines. The products of the third oven are dropped through a circular gravity chute to a pick-up conveyor on the floor below, from which they are placed on racks for cooling and direct distribution to trucks.

Suspended from the ceiling of the floor below are 2 cooling conveyors, each 100 feet long. They consist of 2 traveling chains, between which are suspended channels to which are affixed a series of wooden fingers about a foot long, forming a "V" with the channel in which the bread rides. These are so suspended that they do not change position when the chains pass over the sprockets. The conveyor loops back and forth 4 times. At the end of the travel each tray is mechanically upset, allowing the bread to slide onto a crossover conveyor, from which it is dumped on a pick-up table. Both coolers make use of this table, which consists of a traveling canvas belt that feeds 5 automatic wrapping and sealing machines.

FIXING STANDARDS

For Food Products

By **KATHARINE A. SMITH**
Food, Drug, and Insecticide Administration
U. S. Department of Agriculture

DEFINITIONS and standards for food products have been under consideration by a standards committee ever since 1897, when the Association of Official Agricultural Chemists assigned to five of its members the duty of compiling specifications for foods and food ingredients that would receive the same recognition as those in the field of drugs set forth in the U. S. Pharmacopoeia. Although at that time the federal food and drugs act had not been passed, several states and cities had laws designed to prevent traffic in adulterated and misbranded foods, and the chemists employed to enforce these laws, many of whom belonged to the Association of Official Agricultural Chemists, found themselves greatly handicapped by the lack of generally accepted standards. Each was forced to formulate his own standards, so that a legal action instituted in good faith by a control official often was ultimately lost through the failure of several experts to agree upon the bases of comparison. Another unfortunate result of the lack of a consensus of expert opinion was the incorporation in state legislation of arbitrary standards that occasionally worked injustice to innocent producers and dealers.

The first committee appointed to formulate official definitions and standards for food products faced a very difficult task. In the first place, little had been printed, or even done apparently, on the composition of domestic foodstuffs, and the results on European products reported in the literature did not always hold true for American products. Furthermore, most foods and food ingredients on American markets varied widely in quality, and therefore in composition, owing to variations in cultural conditions prevailing during the growth of plants or to differences in the processes of manufacture. For example, Singapore black pepper was found to be a hard and perfect berry, with a higher percentage of starch and a lower percentage of fiber than certain other grades. If standards were based solely on analyses of the better grades, the lower grades, though genuine, might be condemned as adulterated. Nor was it too easy for the committee to determine what constituted adulteration. Assuming, for instance, that pepper stems were adulterants, where should the line be drawn between stems not readily removable in the course of preparation and stems added to increase the weight?

Year after year this committee, reappointed at each annual convention of the Association of Official Agricultural Chemists, struggled with the problems involved in the establishment of food standards, reporting its progress at each meeting and obtaining the association's vote of approval on each schedule as it was completed. The trade co-operated loyally in these efforts to develop standards, furnishing samples of products, both natural and manufactured, and giving expert opinion on manufacturing processes, while federal, state and city chemists collaborated in making the necessary analyses.

The results thus achieved and the constantly growing need for official food standards led Congress, in 1902, to provide in the appropriation bill for the Department of Agriculture that "the Secretary of Agriculture, in collaboration with the Association of Agricultural Chemists and such other experts as he may desire to consult, shall fix standards for all food products for the information and guidance of the officials and courts charged with the execution of pure-food laws." This clause appeared in the department's appropriation act every year after that until 1906, when the federal food and drugs act was passed.

In 1902, the National Association of State Dairy and Food Commissioners appointed a committee to confer with the Association of Official Agricultural Chemists committee on the matter of drawing up definitions and standards for food products. For several years a joint committee composed of five members of the Association of Official Agricultural Chemists and three members of the National Association of State Dairy and Food Commissioners met annually and issued many important definitions and standards.

SHORTLY after the federal food and drugs act went into effect the committee became less active, until by 1912 it was practically inoperative. In 1913, however, when the whole question of co-operation with state enforcing agencies became a vital one for the Department of Agriculture, a new standards committee was created. At a meeting of federal and state food officials, a plan was proposed, and later approved by the Secretary of Agriculture, setting up a joint committee on which the U. S. Department of Agriculture was represented by three members, the Association of Official Agricultural Chemists by three members, and the Association of American Dairy, Food, and Drug Officials by three members, the Secretary of Agriculture to approve the nominations made by the two associations. In this form the standards committee still meets, usually twice a year, at the Washington, D. C., offices of the Food, Drug, and Insecticide Administration, the unit of the U. S. Department of Agriculture now charged with the enforcement of the federal food and drugs act.

The representatives of the Association of Official Agricultural Chemists on the present Food Standards Committee are C. D. Howard, Chief of the Division of Chemistry and Sanitation of New Hampshire; E. M. Bailey, Chief Chemist of the Connecticut Agricultural Experiment Station, and Guy G. Frary, State Chemist of South Dakota. The representatives of the Association of Dairy, Food, and Drug Officials are W. C. Geagley, State Analyst of Michigan; I. L. Miller, Food and Drug Commissioner of Indiana, and E. L. Redfern, Chief Chemist of Iowa. The representatives of the Department of Agriculture included the late R. W. Balcom, in charge of Food Control; W. S. Frisbie, in charge of

Co-operation, and A. S. Mitchell, all of the Food, Drug, and Insecticide Administration.

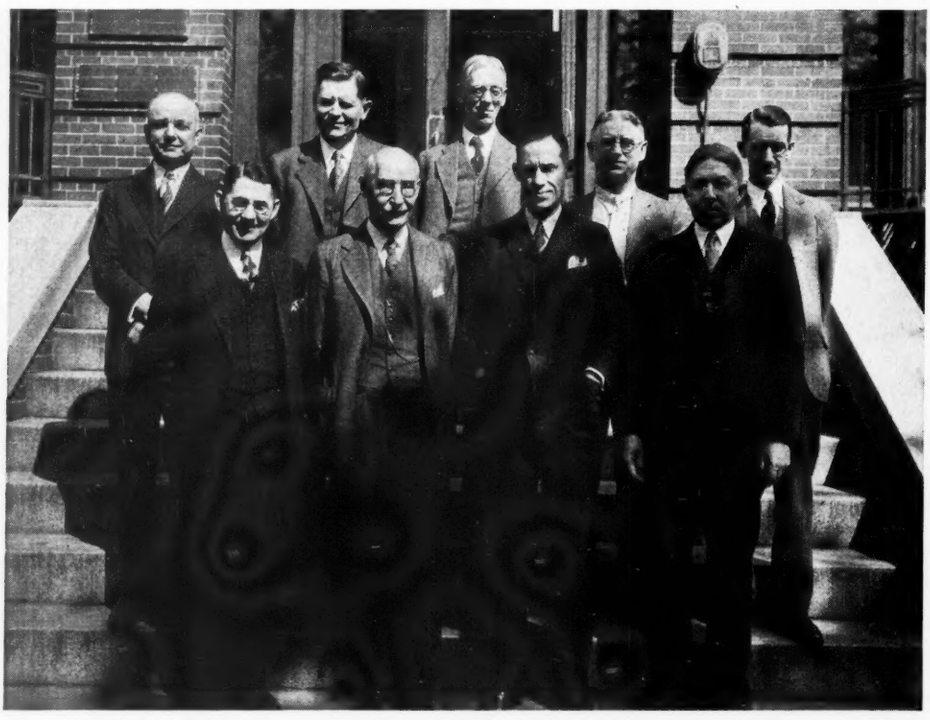
Although the accumulation of scientific and technical data during the last 40 years has greatly facilitated the solution of certain problems that perplexed the first standards committee, some of the same difficulties remain to baffle the committee of today. Cultural conditions still cause variations in the composition of natural products and lack of uniformity in factory processes still gives rise to differences in the composition of manufactured articles. Moreover, the ever-changing technique of manufacture constantly brings to the front new questions never even suspected by the original five members.

In drawing up definitions and standards for foods and food ingredients the committee must consider the interests of consumers and manufacturers alike. In establishing maximum or minimum limits for certain constituents in foodstuffs, thus defining them or providing standards for them, the committee is guided by the consuming public's conception of the article under consideration and also by what is consistent with good manufacturing practice. To retain its identity in the eyes of food officials, each product must contain no less of the desirable constituents and no more of the undesirable ones than called for by the official definition or standard. Thus each definition and standard gives food officials a uniform basis for determining the authenticity and identity of a food or a food product and at the same time serves as a yardstick to manufacturers in regulating their output.

It might seem that "limits" would be a more fortunate term in this connection than "standards." For to most people the word "standard" implies an article well up on the scale of quality, whereas the official food "standards" are merely the limits of quality below which legal products may not go. A food that just meets the standard recognized by the government is not necessarily high grade. As a matter of fact, foods sold today in the United States are generally above the minimum requirements of the official standards. It is not at all unusual for spices to contain much less extraneous matter, such as stems and chaff, than the standard permits, and most of the flour on the domestic market contains less than the 15 per cent of moisture and the 1 per cent of ash allowed in the definition. Again, legal cream may contain as low as 18 per cent of milk fat, whereas that sold in many places contains 20 per cent of milk fat.

To complete the schedule worked out by the first standards committee, to devise new definitions and standards, or to amend those already in existence, to meet the need caused by the appearance of new products on the market, by the development of a new manufacturing process, or by the adaptation of an old process to some new purpose, the present committee constantly considers new specifications. As soon as any particular product comes up to be defined, the committee gathers all the information possible on that product, instituting research when necessary. From the facts thus acquired it works out what seems a fair and proper standard. When this standard is so shaped as to meet the approval of the members of the committee, it is made public, and all interested food officials, manufacturers, and others are invited to submit comment and criticism. At its next meeting the committee reviews the proposed standard in the light of the comments received; amends it, if necessary or desirable, and then submits it to the Secretary of Agriculture for approval. When a new draft gives rise to very general criticism, indicating a marked disagreement with the committee's opinion, a public hearing is held so that all the points at issue may be thoroughly discussed.

If the Secretary of Agriculture disapproves the standard it is sent back to the committee for further consideration. If he approves it the standard is at once issued as a publication of the U. S. Department of Agriculture, becoming an integral part of the nation-wide system of control that has gone far in bringing the American food supply to its present high standard of purity.



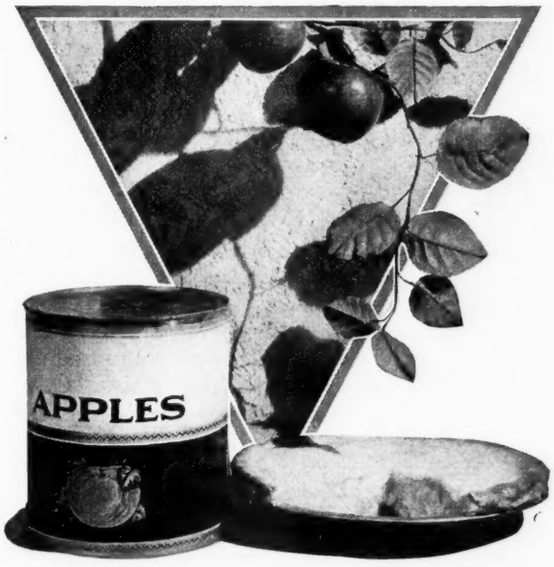
MEMBERS of Food Standards Committee before the death of R. W. Balcom

Factors in APPLE CANNING

That Make for

BETTER PIES

By L. CHARLES MAZZOLA
New York Canners, Inc.
Rochester, N. Y.



THE MERITS of the several varieties of apples packed in different sections of the United States have long been a matter of controversy. In an attempt to evaluate in a scientific manner the more important characteristics of canned apples in relation to their geographical origin, their variety, and their processing treatment, the present investigation was conducted. It covered some 32 states, lasted 2 years, and led to several significant conclusions.

The investigation was divided into three distinct parts. First, it was necessary to find out just what facts on the relative merits of the numerous varieties of apples grown throughout the United States had already been gathered by authorities on pomology. What the jobbing trade and consumers (bakers and institutions) desired in a canned apple also was in doubt. It was necessary, therefore, to collect information as to the particular qualities which they regard most highly. Third, in an effort to obtain facts entirely free from any personal opinion or bias, a series of original experiments was undertaken with the object of supporting, contradicting, or modifying the information gathered from the first two sources.

The investigation was undertaken with an unbiased mind, and without a desire to reach any preconceived conclusion. In requesting information from jobbers and consumers, it was implied that they would be advised of the facts which the investigation disclosed. Since it would be a difficult task to write to each one who contributed, and inasmuch as it is desired that the entire trade be given the facts, the results are presented in this article.

Apple Varieties

Among the authoritative works on pomology consulted were Prof. S. A. Beach's two volumes. He describes in discriminating, quantitative phraseology the value of the varieties of apples grown for commercial purposes in various parts of the country.

Baldwin—This is a bright-red winter apple. On account of its firm texture and thick skin, it stands handling moderately well. Because it lends itself admirably to its soil, geographic and atmospheric conditions, it is the leading variety in the commercial orchards of New York State.

Flesh—yellow, firm, moderately coarse, crisp, rather tender, juicy, agreeably sub-acid, somewhat aromatic, good to very good.

Skin—tough, somewhat light yellow or green and mottled with bright yellow, striped with deep carmine.

Greening (Rhode Island)—As its name implies, this apple is basically green in color. As it ripens, it becomes more or less yellow, occasionally with a bright red cheek. The Greening is generally accepted as superior to the Baldwin in flavor, but because it bruises easily it does not lend itself to canning as well as the Baldwin. When handled under ideal conditions, it produces a product that is as good as, and sometimes superior to, the Baldwin.

Flesh—yellow, firm, moderately fine grain, crisp, tender, juicy, rich, sprightly sub-acid, peculiarly flavored, very good.

Skin—only moderately thick, smooth and waxy, green to more or less yellow, with an occasional bright red cheek.

Northern Spy—When well grown, this apple is superior in flavor to both Baldwin and Greening. The fruit is unusually large and attractive, and is bright red in color. It is more tender than either the Greening or the Baldwin, and for this reason, does not lend itself to canning nearly as well as either of the other two.

Flesh—yellow, rather firm, moderately fine grain, very tender, crisp, very juicy, aromatic, sub-acid, very good.

Skin—thin, tender and smooth, usually bright red.

Black Twig—In the Southern parts of the country, as in Virginia, this is the most popular variety of apple for commercial purposes. It is the Southern variety of the Winesap group, and does not develop in New York State as well as it does in the South.

Flesh—greenish or tinged with yellow, firm, a little coarse, rather tender, juicy, mildly sub-acid, somewhat aromatic.

Skin—tough, somewhat grass green or yellowish, largely covered with dull, deep red and indistinctly striped with deeper red.

York Imperial—In Pennsylvania and the Middle Atlantic States, the York Imperial is the most popular variety grown for commercial purposes. When properly developed, the fruit is from medium to large. One of the objections to this fruit is the fact that its shape—usually oblique or lopsided—gives difficulty in the paring machines.

Flesh—yellowish, firm, crisp, somewhat flaky, a little coarse, moderately tender, moderately juicy, sub-acid to almost sweet, somewhat aromatic.

Skin—tough, bright smooth green or yellow, blushed with moderately bright red, indistinctly striped with carmine.

Spitzenburg—On the Pacific Coast, the best varieties for canning purposes are the Spitzenburg and Newton. The Spitzenburg belongs to the Baldwin family. When well grown, it is handsomely colored and excellent in flavor and quality. The fruit, as well as blossoms and foliage, are susceptible to scab fungus attacks. It is also injured by apple canker, and special attention is required to protect it from these diseases.

Flesh—fringed with yellow, firm, moderately fine, crisp, rather tender, juicy, aromatic, sprightly sub-acid, very good.

Skin—tough, sometimes waxy, deep rich yellow, oftentimes almost completely covered with bright red, in the sun deepening to very dark almost purplish blush.

Regardless of the variety of apples used, or the section of the country in which they are grown, it is important that they should be packed at the proper maturity. This governs all of the important qualities of the fruit: its aroma, tartness, texture, and freedom from blemishes.

Canning Processes

Broadly speaking, all of the methods of canning are a modification of one of three principal processes. After the fruit is pared, trimmed and cored, then quartered and sliced, it is: (*a*) passed through a brine tank for a short period of time to arrest oxidation of the fruit and immediately packed and cooked (generally called the "old process"), or (*b*) soaked for a long period of time, varying from 8 to 24 hours, at various temperatures, from room temperature to slightly elevated temperature, in either plain water or mild brine solution (generally referred to as the "soaking process"), or else (*c*) placed on trays in a chamber which is closed and evacuated and into which either steam or water is then introduced (generally called the "vacuum process").

With the "old process," it is difficult to produce a solid-pack apple without breaking up the pieces, for they are quite brittle and must be pressed in the can to pack the necessary weight. In this pressing the pieces are often badly broken.

The "soaking process" toughens the apples somewhat, and they do not break so easily, making it easy to put the required weight in the can. This process, however, produces other effects which may not be so desirable, loss of tartness and flavor of the apples being the principal detriment.

The "vacuum process" gives a product so impregnated with water that the necessary weight for the contents is easily put in. In fact, some of these cans weigh as much as 7 pounds without any free water. While the process gives this advantage in weight, the bloated appearance that the apples assume after treatment, and the loss of tartness of the fruit, are decided disadvantages.

What the Trade Said

The first letter mailed to the trade asked:

1. So long as the can is filled to the top, does it matter what the drained weight is?

2. Assuming that a can of sliced and a can of quartered apples were submitted to you, both of which were equally full, which would you prefer?

3. Some of the so-called "solid pack" sliced apples with drained weight from 6 to 6½ pounds have been marketed. Some users state that these are "waterlogged" and that the flavor has been impaired in the processing. Please state your experience with this style of pack.

The letter containing the above questions was sent to most of the larger jobbers in the country and also to 132 of the leading pie bakers located in 32 states. Over 90 per cent replied. While there was some discrepancy of opinion, the preponderance of the replies showed the following:

1. That both bakers and jobbers are interested in the drained weight of the apples, even though a can was filled to the top.

2. That while there seems to be some demand for quartered apples, the demand for the sliced type is greater by far.

3. That both jobbers and bakers are overwhelmingly in favor of a heavy-pack apple. Frequently they admitted that they would not use such solid packs as had been offered them yet, and stated numerous objections to the solid packs which they had seen, but their favorable attitude to the principle was clearly shown. Some of them went so far as to predict that, once the packers had learned how to do the job without sacrificing aroma and tartness of fruit, this style of packing would predominate.

Experimental Work

In gathering fruit for the experimental work, requests were sent to representatives and brokers in five of the large markets east of the Mississippi to purchase in the open market samples of the apples packed in No. 10 cans that were the most popular in their respective territories. The 16 samples received thus represented the leading brands sold throughout the country. As soon as they were received, the labels were stripped from each can and each sample was given a number. The investigation was conducted without any identifying mark other than the number given to each specimen. The names were not referred to until after the investigation had been completed.

Rating the Apples

In order that relative values in the various samples could be described intelligently, it was necessary to provide a method of rating the apples. A brief search revealed nothing to satisfy this requirement, and it was necessary to develop our own score sheet.

The score sheet first tried made use of the principle employed by the Wisconsin Pea Packers and various government bureaus in which each of the various qualities is given what is considered a proper weighting when contrasted with every other quality. It was soon dis-

covered, however, that this might lead to considerable difference of opinion, due to individual interpretations of the relative importance of each quality.

To eliminate these rather important objections, a score sheet was developed which emphasizes the descriptive importance of grading and which, when interpreted by a rather simple empirical formula now in the process of development, quite adequately describes the product under consideration. The development of this formula will be covered by an article in FOOD INDUSTRIES in the near future.

Once the score sheet was developed, the 16 samples were each scored by two independent investigators. As these independent scorings checked within 1 point of the total in many cases, and within 2 points of the total in most cases, they were considered consistent and were accepted as proof that the sheet was accurate. Therefore, the results thus obtained were used without further check. A specimen copy of this score sheet is shown in Fig. 1.

Table I shows the total quality scoring as obtained with the aid of the score sheet.

The tabulation is shown in graphic form in Fig. 2. This chart shows the intrinsic difference in quality of the various apples. The top curve was drawn in sequence, starting with the highest percentage, ending with the lowest, without regard to what the samples represent. In the lower curve, the results were tabulated in similar sequence, but with the difference that the samples representing New York State fruit are segregated from the rest of the samples. The others were tabulated in similar sequence.

Table I—Quality Scores

Sample	Quality Score Per Cent	Sample	Quality Score Per Cent
10	94	13	78
15	90	4	78
3	89	16	76
2	88	11	75
14	88	7	70
1	83	6	69
9	81	5	68
8	81	12	68

The broken horizontal line both in the New York State group and the Northwestern and Western is the mathematical average of the respective samples it covers. In the case of the New York State fruit, it shows an average scoring of 84 per cent and in the case of the Western and Southern fruit, an average scoring of 74 per cent.

The chart clearly supports the widespread preference for New York State fruit. It checks pomological authorities as well as the preference shown by jobbers and consumers previously quoted. It shows that out of 10 New York State samples, 6 of them scored higher than the best of the others. One was equal to it and only 3 were lower than the best. Only 1 of New York State fruit was lower than the actual average of the Southern and Western fruit. Five out of 10 New York State products scored 88 per cent or better.

FIG. 1—SCORE SHEET upon which canned apples were judged

APPLE SCORE SHEET

Date_____

Sample (See Below)				A	B	C	D	E	F	G	H	I	J
Indicate - size of Fruit: Large (L) Medium(M) Small (S)													
Indicate kind cut 1/16-1/12-1/8-1/4,etc.													
Drain Weight in lbs. and oz. (2 Min.drain)													
Volume liquor (liquid oz.)													
Fill----------9	a. Full	Fl.	8-9										
	b. Skimpy	Py.	6-7										
	c. Slack	Sl.	3-5										
Color---------9	a. Natural for Variety	Nt.	8-9										
	White	Wt.)											
	Dark	Dk.)											
	Pink	Pk.)*											
	Mixed	Mx.)											
	Off	Ff.)											
	*(b. Present		6-7										
	(c. Prominent		3-5										
Can (Inside)- 9	a. Bright	Bt.	8-9										
	b. Dark	Dk.	6-7										
	c. Black	Bk.	3-5										
Blemishes---- 9	a. Free	Fr.	8-9										
	b. Present	Pr.	6-7										
	c. Prominent	Pm.	3-5										
Impurities, Skins,etc.--- 9	a. Free	Fr.	8-9										
	b. Present	Pr.	6-7										
	c. Prominent	Pm.	3-5										
Aroma-------- 9	a. Prominent	Pm.	8-9										
	b. Present	Pr.	6-7										
	c. (Blank	Bl.)	3-5										
	(Foreign	Fg.)											
Tartness----- 9	a. Prominent	Pm.	8-9										
	b. Present	Pr.	6-7										
	c. Blank	Bl.	3-5										
Salt--------- 9	a. Free	Fr.	8-9										
	b. Present	Pr.	6-7										
	c. Prominent	Pm.	3-5										
Cut---------- 9	a. Clean	Cl.	8-9										
	b. Rough	Rf.	6-7										
	c. Broken	Bn.	3-5										
Texture------ 9	a. Tender	Td.	8-9										
	b. (Firm	Fm.)	6-7										
	(Soft	Sf.)											
	c. (Hard	Hd.)	3-5										
	(Mushy	Ms.)											
Uniformity of Size------ 9	a. Uniform	Un.	8-9										
	b. Mixed	Mx.	6-7										
	c. Irregular	Ir.	3-5										

Sample & Size Tin	Brand	Packer's Name	Seller's Grading and Year Packed	Variety	No. Cases and Remarks
A					
B					
J					

Scored by _____

CARE AND CONTROL NEEDED

While this chart shows that poor results can be produced by New York State fruit when poorly handled (as, for instance, sample No. 5), it also shows that with ordinary care a superior product can be packed from this fruit (see the average pack), and that with fair control, superior results may be expected (see sample No. 10).

It is well to repeat that these samples were purchased in the open market by our representatives and brokers, and represent the most popular brands of apples in each respective territory. The investigator knew the samples only by their designated number and had no hint of their real identity during the tests. For obvious reasons the identity of all samples is withheld.

The drained weights found in the various samples are shown in Table II.

Table II—Drained Weights of Samples

Sample	Drained Weight, Ounces	Sample	Drained Weight, Ounces
8	109¼	10	89¾
7	105⅝	2	83½
4	104½	5	83
12	103	16	82¼
13	102	15	79½
3	101½	1	78½
6	98¼	11	78
9	92	14	68

Experimental Pies

The next step in the experimental investigation was to bake these various samples into pies to determine what relation, if any, the drained weight has to the number of pies produced per can; and to observe and describe what difference, if any, there was in the filling of each pie produced from the various samples. Accordingly, we familiarized ourselves with the latest research contributions available in commercial and professional literature as well as with actual shop practice.

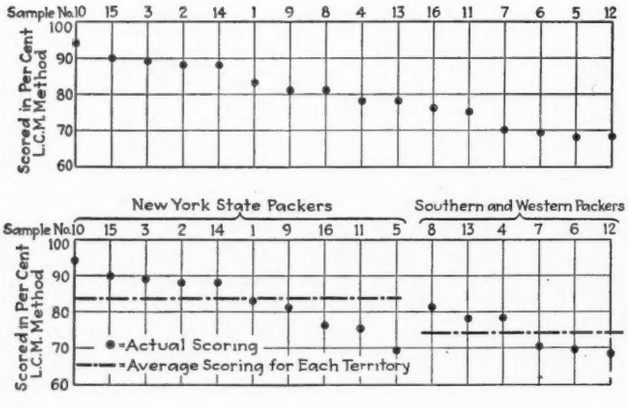
The practice of precooking the apples before putting them in the pie is reported to be advantageous by some bakers. Particularly is this said to be so when types of apples are used which apparently resist the penetration of sugar and spices, or which have a tendency to remain hard in the centers. There are many apples with which this operation is not necessary.

When precooking is used, it is necessary that the pie filling be cooled and then placed in a refrigerator at a temperature not higher than 40° F. If the filling is added to the pie crust while hot, or even warm, it will have a tendency to melt some of the shortening in the paste and thus produce a tough crust.

Generally speaking, good pie crust can be produced from a good grade of soft wheat flour, about one-half of its weight of shortening, and a small quantity of salt and cold water. It is important that the water be ice cold and that the paste shall not be allowed to get warm, for the same reason as mentioned under filling. It is also essential that the flour, shortening, water, and salt be mixed for as short a time as possible, as it has been well established that the longer the paste is mixed, the tougher will be the crust. The paste is then rolled into sheets and placed in the dishes as the bottom crust. The cold filling is added and it is then covered with the top crust, trimmed, and baked.

The quantity of sugar used depends on the tartness of the fruit employed. Fruit tart enough to require the most sugar has a twofold advantage: it produces a pie more nearly like the fresh apple pie on account of its tartness, and is more economical because the sugar used is ordinarily cheaper than fruit of the same weight. For those who use a filler, the great advantages of tart fruit are obvious. In fact, many of the bakers have found it necessary to introduce foreign acids, such as lemon juice or vinegar.

FIG. 2—PHYSICAL ANALYSIS of canned apples


Sample No. 10 15 3 2 14 1 9 8 4 13 16 11 7 6 5 12
Scored in Per Cent L.C.M. Method
100
90
80
70
60
New York State Packers
Southern and Western Packers
Sample No. 10 15 3 2 14 1 9 16 11 5 8 13 4 7 6 12
Scored in Per Cent L.C.M. Method
100
90
80
70
60
•=Actual Scoring
=Average Scoring for Each Territory

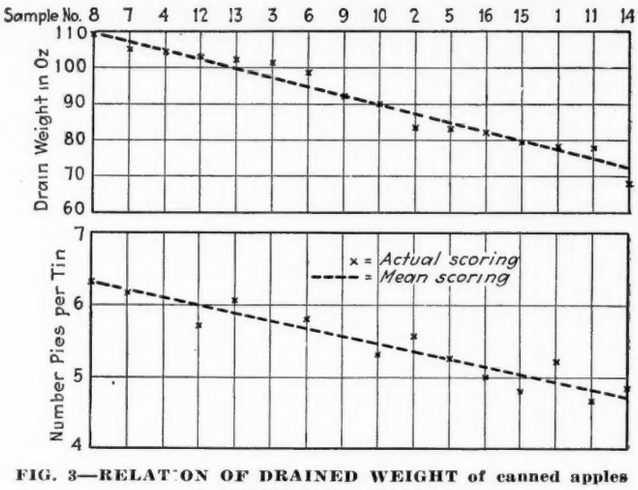


FIG. 3—RELATION OF DRAINED WEIGHT of canned apples to number of pies produced

Another practice used by many bakers is known as "juicing" the apple pies. This consists, roughly, in retaining a portion of the juice and adding it to the pie after baking. Among the advantages claimed for this practice are: pies are baked in a much shorter time; they do not boil over; accurate control over the quantity of juice is secured, and considerably more filler can be used. The use of pie fillers, however, is not very general and it is done largely for the purpose of reducing the cost of the pies.

Baking the Pies

A rotating oven or one so constructed as to insure an even distribution of heat, thus producing a uniform temperature in all parts of the oven, meets with most general approval. While many bakers produce good pies by looking in the oven to control the temperature by personal judgment, the advantages of controlling temperatures by means of pyrometers are generally recognized. Pyrometers do not always indicate exact temperature involved, because of the relative position of the source of heat, the oven bottom, and the point where the thermocouple is placed. Even where the temperature given is only relative, however, the baker can easily determine what this relative temperature in his particular oven must be to give the desired results.

Many authorities assert that the temperature most suitable for pie baking is around 420° F. In these tests, using a direct-fired oven equipped with a mechanically revolving bottom and with the thermocouple of an indicating pyrometer suspended from the middle of the oven, it was necessary to employ an apparent temperature of 500° F. to produce the best results. It is the usual practice to have the oven from 50° to 75° higher than the temperature at which baking is to be done, because of the lowering of temperature caused by the introduction of the cold pies.

The temperature at which the baking is done, of course, is tied up with the length of time that the pies are left

in the oven. However, it is safe to say that the range is from 420° to 500° F., and that the time is from 25 to 45 minutes. An oven that is too cold causes the pie filling to boil over before the crust is baked; a hot oven, on the other hand, causes the crust to become markedly browned long before the filling is cooked, producing a soggy crust as well as fruit only partly cooked.

The next step in the investigation was to determine the relation of drained weights and pies produced per can. The contents of each tin was dumped into a copper kettle, and to each sample was added 12 ounces of sugar and a small quantity of cinnamon. These were thoroughly mixed and exactly 18 ounces of cold apple filling was added to each pie. The number of pies produced was recorded, and the surplus filling was carefully weighed. The results are shown below:

Sample	Number of Pies Produced	Surplus Filling, Ounces	Sample	Number of Pies Produced	Surplus Filling, Ounces
8	6	5¾	1	5	4½
7	6	3½	16	5	0
13	6	1	14	4	15½
6	5	15	15	4	15
12	5	13¼	11	4	12½
2	5	11¾	*3	..	..
10	5	5¾	*4	..	..
5	5	5	*9	..	..

*Unable to obtain samples of apples for this test.

After the pies were baked, the top crust was removed from a complete set of them, thus exposing the filling in each pie to give a better view of the contents for scoring purposes. It was found impossible to obtain any accurate weighing of the pie filling after baking.

The results of this test, together with drained weights, are shown in Fig. 3. The top curve represents the drained weight. This was plotted in sequence, beginning at the top with the sample containing the highest drained weight. These drained weights are indicated by crosses, and the broken line through these crosses represents the mean of weights scored. The bottom curve represents the number of pies produced per tin. These were also plotted in sequence, beginning at the top with the sample that produced the largest number of pies.

The chart shows the quantitative relation between the drained weight of a No. 10 tin of canned apples and the number of pies produced per tin. It will be observed that the mean of the drained weights and the mean of the number of pies produced, as represented by the broken line through the crosses, are perfect parallels. The slight variation from the mean indicated by the crosses can be largely attributed to manipulative discrepancy. It shows conclusively that, when the weight of pie filler is considered, the number of pies produced per can of apples varies with the drained weight.

Even though exactly the same weight of apple filling was placed in each pie, it was observed that those pies baked with apples packed by vacuum processes, as evidenced by their bloated appearance, shrunk to a greater extent than did the others. This appeared to be true also of all waterlogged apples.

The color of all the fruit in the pies was good, but in apple flavor and tartness they were decidedly different. When these results are shown graphically, the curve is almost an exact duplicate of the quality chart shown in Fig. 2, which indicates that the tartness and flavor found in the raw fruit is carried right through to the pie. This same phenomenon was observed in baking tests conducted with the trade all over the country.

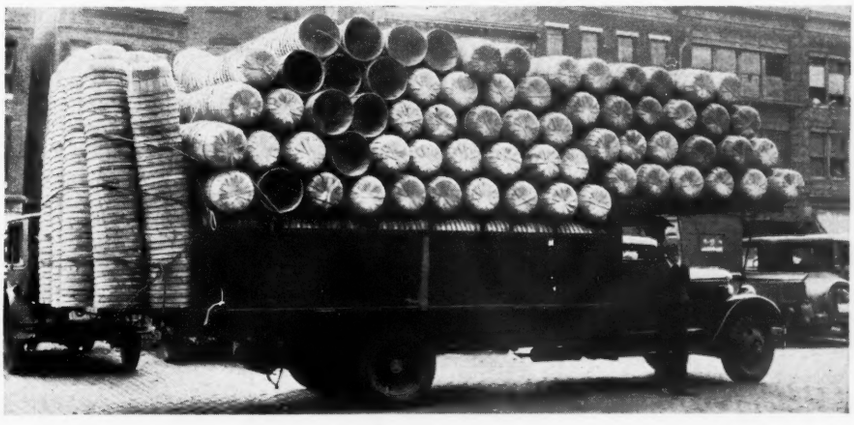
The Ideal Canned Apple

In reviewing and co-ordinating the various parts of the investigation, there emerges a number of requirements for superiority in canned apples. They must be packed to drain 6 pounds or over, and by a process that will retain the full aroma and tartness of the fresh fruit. It is desirable that they be New York State winter fruit, uniform, with good natural color, and with texture from tender to slightly firm. Furthermore, they should be free from salt and from free water.

In conclusion, the advantages of such a product in the manufacture of pies may well be summarized:

1. It retains the fresh-like tartness and aroma.
2. It bakes into tender pies at proper temperature in 30 minutes.
3. On account of the greater tartness, more sugar is necessary, producing the additional pie filling very inexpensively.
4. There is no deterioration of the canned fruit on standing from autumn until the following summer, whereas this is certainly not so with fresh fruit in cold storage. Thus, standardization on the proper kind of canned apples will produce uniform pie the year round, one that compares very favorably with pies made from fresh fruit when using best fruit in the best condition.
5. The cost of carrying canned apples is negligible as compared with the cost of carrying fresh apples in cold storage.
6. The volume of a can of apples remains constant on standing through the year, whereas the fresh fruit constantly shrinks in volume in cold storage.
7. Properly canned fruit eliminates the necessity of introducing foreign acids.

▼ ▼ ▼



ABOUT 3,600 BASKETS regularly make the 160-mile trip from a basket company at Berryville, Va., to Baltimore, Md., aboard this 2-ton Autocar truck. It is owned by a prominent Baltimore produce dealer.

WET GRINDING Characterizes the Manufacture of PREPARED MUSTARD

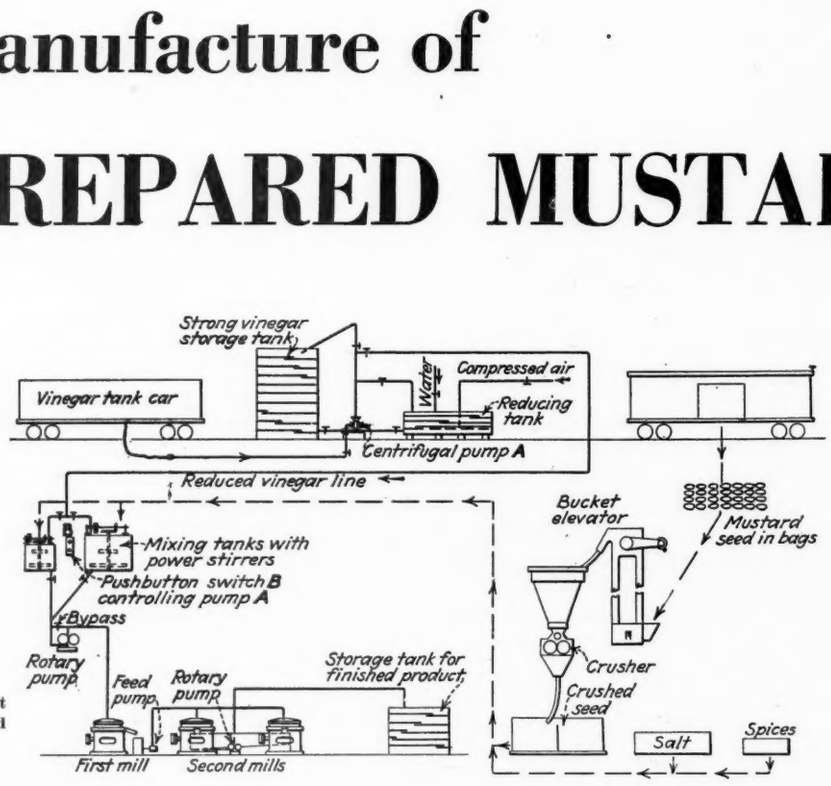


Fig. 1—Flow sheet of prepared mustard manufacture

By LAURENCE V. BURTON
Assistant Editor

THOSE who are old enough to recall the days of Chicago before the fire may remember the Premium Mustard Mills, founded by William Ohnesorge in 1852. Premium Mustard, a brand originated by Mr. Ohnesorge 78 years ago, has continued through all the changes that the passage of time has effected. For 31 years the Premium Mills continued under the Ohnesorge ownership and were then purchased by Morris C. Plochman in 1883. In 1907 the firm name was changed to Plochman & Witt, continuing until 1924, when B. H. Harrison purchased the Witt interest, and the name of the company was changed to Plochman & Harrison. The present Carl M. Plochman is a son of Morris C. Plochman, who purchased the company in 1883.

Despite the age of this institution, which is fairly old as commercial institutions go in the United States, an experienced visitor can find no trace of old methods or antiquated equipment in its plant. The Plochman & Harrison plant is modern in every department. Forty-eight inch buhrstone mills always are standard equipment in a mustard grinding establishment. Whenever an acid product like prepared mustard is to be ground, the old buhrstone mill, the origin of which runs back into the early history of milling, is always used. While improvements in mustard mills have been developed during the past several years, buhrstones are still required for the grinding.

Prepared mustard is a smooth paste made by grinding mustard seed, salt, and spices with dilute vinegar. So many formulas for preparing mustard have been published heretofore that it is unnecessary to reprint one of them here, but it is advisable to direct attention to the fact that pure prepared mustard does not contain any added mustard bran.

Such a negative statement is in order because every few years someone sets up a new mustard mill that often is operated on the basis of one of the old published mustard formulas, the origin of which must have been back in the days before the Food and Drugs Act of 1906. In the past 15 or 20 years several firms have been led into trouble by following one of these illegal formulas that are perpetuated in the trade literature. To those who are entering upon this business for the first time, the best plan is to obtain the advice of a competent chemist as to the legality of the product which it is proposed to make.

Operations involved in the manufacture of prepared

mustard can easily be traced in the accompanying flow sheet, Fig. 1. Grinding, of course, is the major operation in making this product, but other unit processes or operations also are employed, such as pumping, diluting, crushing, mixing, aging, and various forms of material handling.

The plant of Plochman & Harrison is a 300x150-feet monitor type building, recently purchased, and is especially adapted to the manufacture of prepared mustard. The center section, which contains the milling room, shown in Fig 3, has a ceiling height of 32 feet with window cross ventilation at the upper levels. The great ceiling height allows the strong mustard fumes to rise, making for excellent working conditions. A feature of the factory is a large 5-ton traveling crane in the center of the plant, in which the milling department is located. Although it is an item of equipment not often found in mustard plants it has proved to be extremely valuable for setting machinery or lifting the stones from the mills for dressing. By having all the manufacturing equipment on the ground floor, the usual rumble and vibration attendant upon the operations of a great many mills is entirely absent in this plant, as everything is mounted on a heavy concrete ground floor.

A railroad siding enters the back end of the factory, as shown in Fig. 3, permitting loading or unloading of carload supplies, except vinegar and coal, directly inside the plant. Vinegar is received in tank cars of the type shown in Fig. 8, and is unloaded by pumping into a 10,000-gallon covered cypress storage tank located inside the building. Piping used for handling vinegar is 1½-inch brass pipe heavily tinned inside and out. The valves are of brass and have been worked over by cutting down certain parts, heavily tinning, and then remachining to fit. The first machining operation is to give space for the tin to occupy, so that when the valve is made to fit properly by subsequent machine work, there will still remain a protective layer of tin.

Pumping the vinegar is accomplished by a small all-bronze motor-driven centrifugal pump. The piping layout can be traced in the flow sheet. To complete the temporary connection between the tank car and the suc-

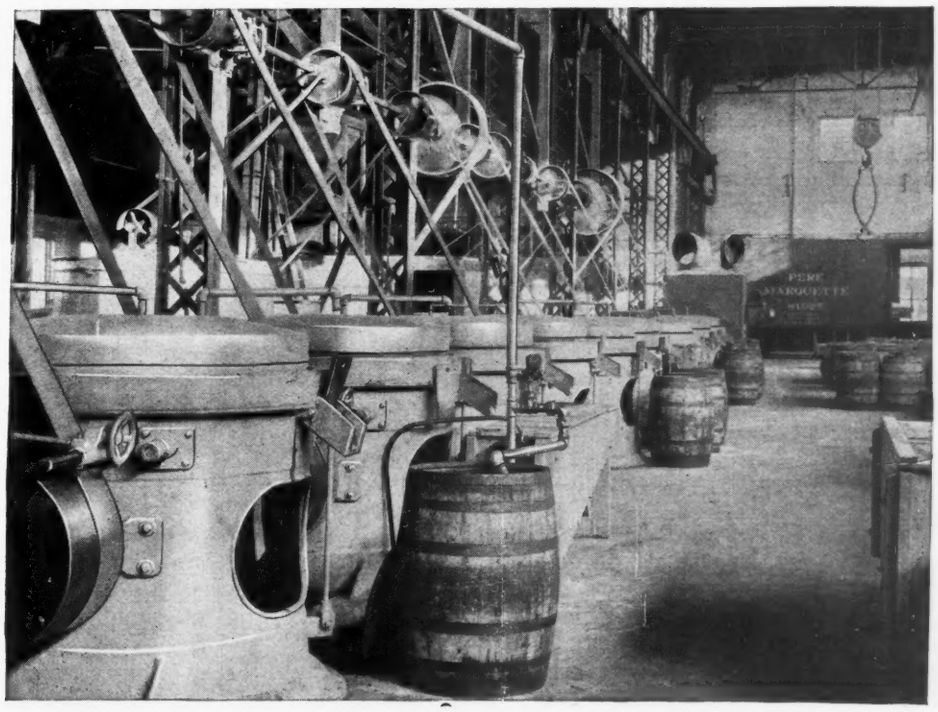


Fig. 2—Lifting stones with the 5-ton crane is an easy job at this plant. Note the motorized mixing tanks of equal size.

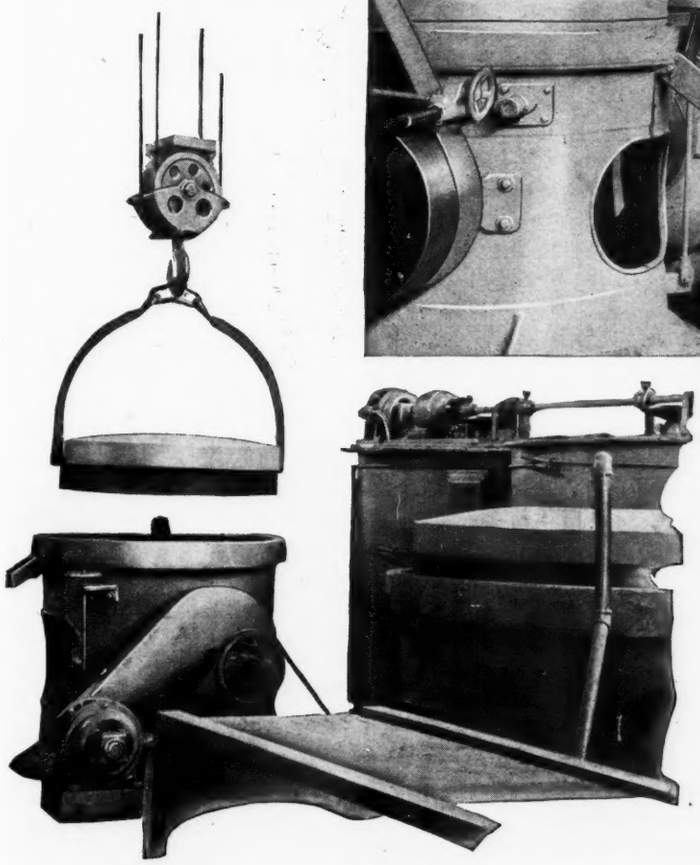


Fig. 3—Mills are located in the monitor to secure good ventilation and plenty of light. A traveling crane is an important item of equipment in this plant.

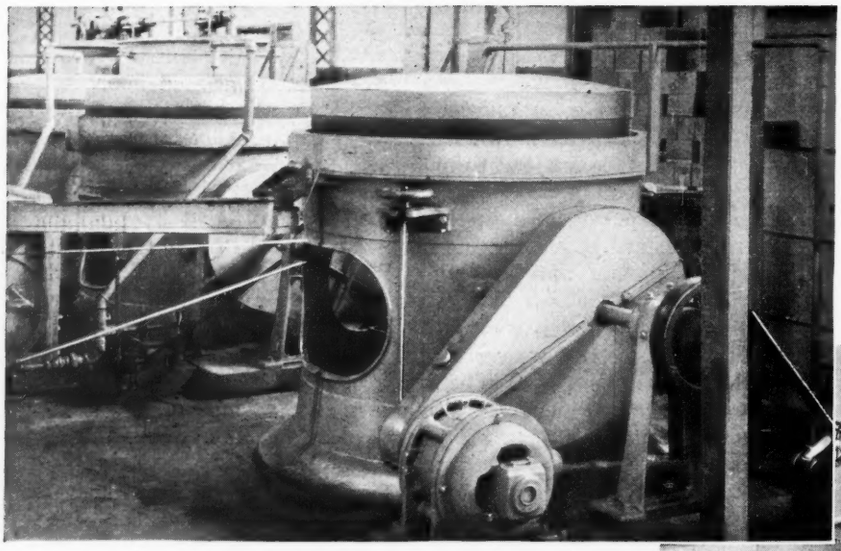
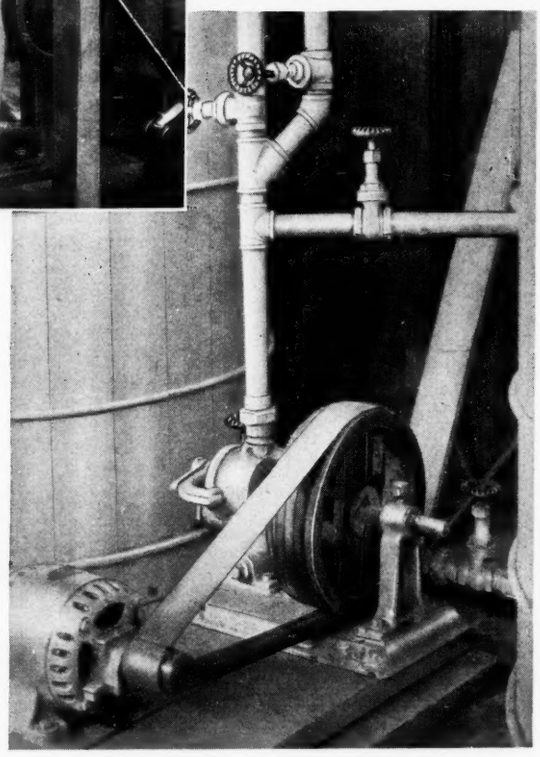


Fig. 4 — The last word in mustard grinding is found in this set of mills. Note the silent chain drive; the rotary pump and its bypass in the lower right corner; and the adjustable-stroke pump in the lower left corner.

Fig. 5—Two storage tanks showing rotary pump and piping arrangements whereby both are served by a single pump.



tion line of the pump for unloading, a 2½-inch rubber hose of the type frequently designated by its makers as vinegar hose is used.

Vinegar, as received from the manufacturer, is too strong for use in prepared mustard, so the next step is to cut its strength by diluting with water. To accomplish this it is pumped into a near-by tank of approximately 3,000-gallon capacity, equipped with a perforated pipe at the bottom for compressed air mixing, and water is added. This plant, of course, is equipped with an air compressor to supply the pneumatic hammers that are used for dressing the stones in the mills. Bubbling air through the vinegar-water mixture, although merely an adaptation of equipment already available, has proved to be more effective in this plant than a mechanical stirrer on large tanks.

As is shown in Fig. 1, the single vinegar pump is so connected that it will serve the purpose of unloading cars, pumping strong vinegar to the reducing tanks, or pumping reduced vinegar to the mustard mixing tanks. Except when the pump is in use for unloading tank cars or pumping strong vinegar to the reducing tank, the valves are so set that it will pump directly to the line going to the mixing tanks whenever the motor is in operation. At each pair of mixing tanks is a push-button switch that controls the pump. All pipe lines are so arranged that they drain completely to the far ends by gravity. Thus when an operator wants vinegar at his set of mixing tanks, he merely presses the button to start the motor, which pumps the vinegar until the current is shut off. Measuring the vinegar in the mixing tanks is done with a gage stick.

The keeping quality of prepared mustard depends largely upon its acidity. If by any chance the acidity is too low, the mustard will spoil, a fact that makes it highly important to maintain accurate control of the vinegar strength. Accordingly the reduced vinegar is tested by titration before any of it is used for manufacture, and if it deviates from a predetermined standard its concentration is corrected by the addition of more strong vinegar or more water.

Mustard seed, received in 220-pound bags, usually is of either the brown or the yellow type, the former making a prepared mustard of a more pronounced pungency than the latter. Various grades of prepared mustard are developed by blending brown and yellow seeds together with spices, salt, and vinegar. Although mustard seed is of extremely small diameter it is necessary to crush it before running it into the mills. In order to assist the chemical reaction which takes place the seed, vinegar, and other ingredients are mixed in the agitator tanks. The first step, therefore, is to elevate the seed to the hopper of a very simple roll crusher that discharges into bins, separate bins being provided for each variety of mustard seed.

Making up the batches is based on weight of the *crushed* seed. Vinegar is measured into the batch mixing tanks, measuring by means of a calibrated gage stick. Then all the other ingredients of a batch are dumped while the mechanical stirrers are in action. Stirring proceeds at all times as long as the mills are in operation, to insure that a uniform mixture of spices, seed, salt and vinegar flows into the mills.

A biochemical reaction, taking place between some of the constituents of the batch commences here and continues through the grinding and the storage periods, and finally ceases. It is complete when the original acrid flavor is replaced by the "smooth" flavor of fully aged prepared mustard.

Mixing tanks of cypress, with power-driven cypress stirrers, are always in pairs so that a continuous supply of material is always available. These pairs of tanks,

Fig. 7—Storing the finished product for aging before bottling or filling in barrels.

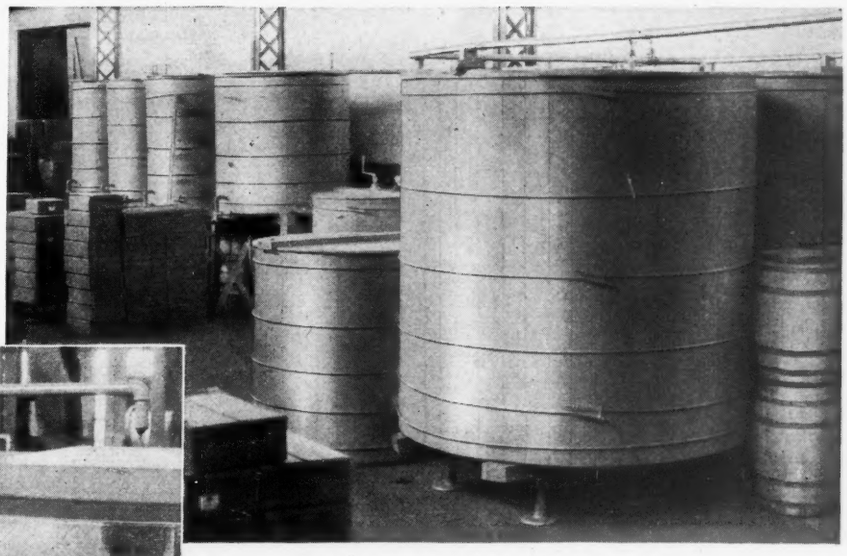
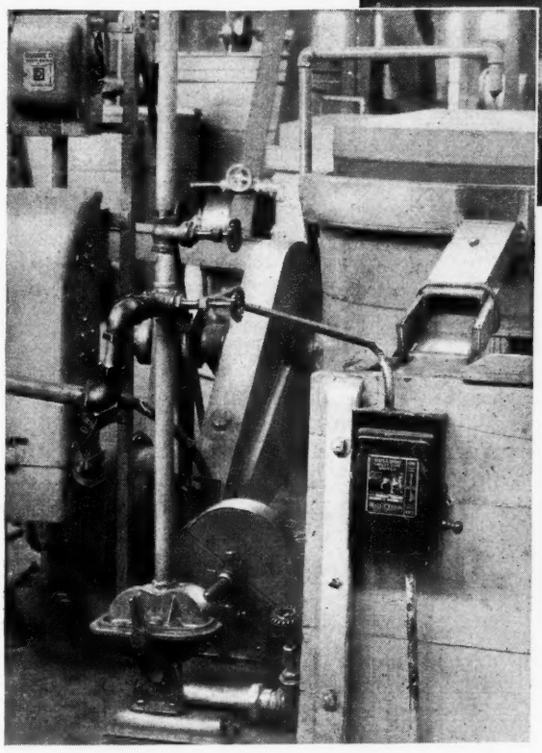


Fig. 6 — Finished mustard flowing out of the mill into the front tank from which it is pumped by the small rotary in the foreground to the storage tanks.



however, are not all equal in size. Plochman & Harrison are using tanks of equal size in connection with some of their mills but more frequently they are found paired in unequal sizes, such as a 5-barrel tank and a 15-barrel tank. The unequal pairing gives greater flexibility.

In the background of Fig. 2 can be seen a pair of equal sized 15-barrel mixing tanks. Each has an actual capacity, roughly, of 1,000 gallons, but of course neither is ever actually filled. The stirrers are operated by a 3-hp. induction motor driving through a Foote Bros. speed reducer to miter gears. A jaw clutch on each of the tanks permits stopping them individually. Tanks of unequal size can be dimly seen in the background of Fig. 6, but in this case the stirrers are belt-driven.

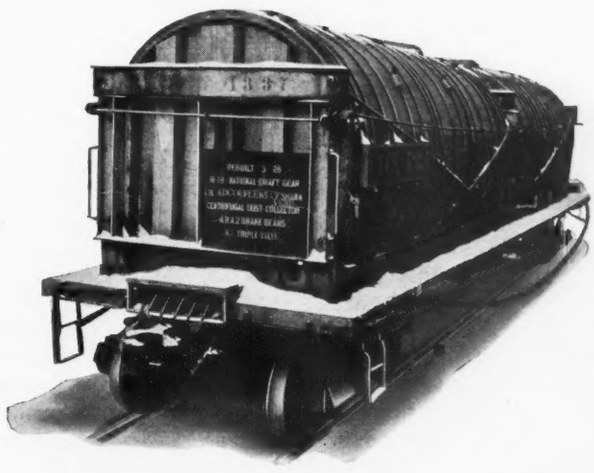
A mustard mill consists essentially of a flat circular stone revolving on a stationary stone. Fig. 4 shows one of the most modern individual motor-driven mills. The silent-chain drive acts also as a speed reducer. The mixture is pumped in at the top through a tinned pipe by a belted all-bronze rotary pump, shown in the lower right-hand corner of Fig. 4. The rate of feed is controlled by bypassing a part of the discharge back to the suction side of the pump.

Mustard grinding involves a double, wet-grinding operation. The discharge from the first mill runs into a tank in the rear, known as the back tank, from which it is pumped into two other finishing mills. Since the first grinding can be carried out at double the rate of the second grinding, the second operation therefore requires two mills, an explanation that accounts for the fact that three mills are nearly always found in a mustard grinding unit.

Proper adjustment of the mill is a very important point in its operation and is accomplished by turning a handwheel such as that shown in Fig. 4. Just as in flour milling, the adjustment of the mill is determined by the miller's judgment. By a too close adjustment the production is unnecessarily slowed down and the mustard may be overheated. Overheating is caused also by stones that have become badly worn and need dressing. After every stopping of the mill, whether by purpose or by reason of a blown fuse, it is necessary to loosen the stones before restarting, and then to readjust them to the proper pressure.

Partially ground mustard flows from the first mill into the back tank, from which it is pumped to each of the second mills by small individual pumps. A recent type of pump, shown at the left side of Fig. 4, is a plunger pump constructed of bronze and having an adjustable stroke. Its drive is by a small belt running from the

Fig. 8—Vinegar, received in tank cars, is pumped into cypress storage tanks inside the plant.



horizontal drive shaft of the mill itself. Other types of small pumps also are used for this purpose.

When leaving the second mill the preparation of the mustard is complete as far as other manufacturing operations are concerned. It can now be run into barrels or may be pumped to the storage tanks, shown in Fig. 7, from which it is repumped when needed for filling barrels or for packaging in the bottling department.

At this plant the single rotary pump shown in Fig. 9 is so piped that it serves all the tanks in that group. The piping arrangement on another pair of storage tanks to permit one pump to perform double service is clearly shown in Fig. 5. It also shows the type of gate valves that are used in mustard pipe lines. All piping and valves are heavily tinned to prevent action upon the vinegar.

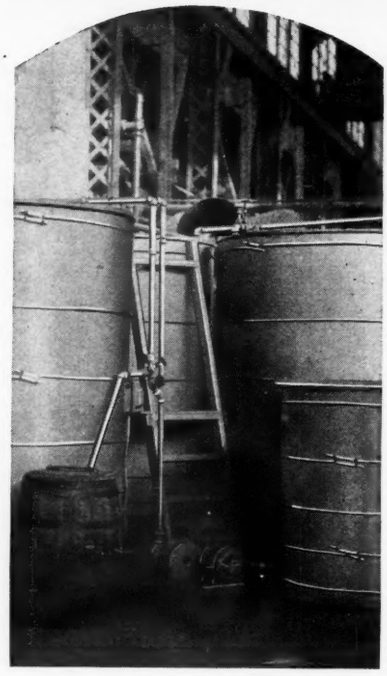


Fig. 9—How one rotary pump serves four storage tanks.

Grinding mustard, like grinding flour, looks simple but it isn't. The reasons why mustard sometimes separates, or why one mustard is more liquid than others when its moisture content is identical, require the services of a colloid chemist to explain adequately. It is not entirely explained by fineness of grinding. In days gone by this writer has seen two samples of prepared mustard of quite different physical characteristics that either by a sedimentation test or under the microscope were exactly the reverse of what one would expect. Sample A would separate on long standing, while sample B was all that could be desired of a good mustard. Before a laboratory test was made the assumption had been that sample B was very finely ground and that sample A was of coarse grinding. Everyone believed this except one skeptic who insisted on a laboratory examination.

The surprising fact was then brought out by physical analysis that sample A was much more finely ground than sample B—that fully 80 per cent of the particles in A were decidedly smaller than those of B. Another curious fact was discovered: B, although more coarsely ground than A, had a remarkable uniformity of particle size in contrast to A. As far as can be recalled in this instance, no decision was ever reached as to why the difference in uniformity of grinding should affect the behavior of the finished goods. A great deal still remains to be learned about mustard and the operation and dressing of buhrstone mills.

▼ ▼ ▼

Exports of Foodstuffs Maintain High Level

UNITED STATES exports of foodstuffs in 1929 were valued at $754,763,000, deviating less than 1 per cent from the total of $760,287,000 recorded in 1928, according to the Foodstuffs Division, U. S. Department of Commerce.

The value of the exports of wheat and wheat flour totaled $192,290,000 during the past year, or less than 1 per cent below that of 1928. The quantity of wheat shipped declined 6.5 per cent, but that of wheat flour increased 15.3 per cent. Exports of corn are the heaviest that have occurred since 1923, totaling 33,745,000 bushels with a value of $34,059,000, an increase of 30.8 per cent in quantity and 29.2 per cent in value compared with 1928. Exports of barley, rye, and oats fell off considerably during the past year. Shipments of rice show an increase of 9.3 per cent in quantity and 11.5 per cent in value.

The export trade in practically all classes of meats shows a decided increase in 1929 compared with 1928, amounting to 445,984,000 pounds with a value of $79,984,000, a gain of 11.9 per cent in quantity and 16.2 per cent in value. Export lard continues to show the rising trend of the past five years, for 1929 amounting to 829,328,000 pounds, valued at $105,530,000, an increase of 69,606,000 pounds and $6,829,000 over 1928.

The exports of fresh fish increased nearly 12 per cent in quantity and 17 per cent in value compared with 1928. Shipments of salted, smoked, dry cured, and pickled fish show some decline. The trade in canned fish, especially sardines, showed a decided increase, there being 123,915,000 pounds of canned sardines exported with a value of $9,419,000, an increase of 54.4 per cent in quantity and 44.4 per cent in value. Shipments of canned salmon remained steady, aggregating 40,967,000 pounds compared with 40,952,000 pounds in 1928.

The growth in the exports of fresh fruits has been very pronounced in recent years. Apples and oranges lead in importance, exports of apples for 1929 aggregating $33,138,000 compared with $26,663,000 in 1928, and oranges amounting to $18,746,000, compared with $13,912,000 a year ago. The value of all exports of fresh fruit totaled $68,661,000, an increase of $12,645,000.

Exports of canned fruit showed little change, totaling $33,046,000 last year, compared with $32,026,000 for 1928. Peaches and pears continued to be the principal canned fruits exported. Dried fruit shipments declined somewhat during the past year, amounting to $34,281,000, or a decrease of 13.5 per cent compared with 1928. Prunes, which constituted 43.3 per cent of the value of dried fruit exports, declined 26.3 per cent in quantity and 8.5 per cent in value; raisins, which comprised 24.5 per cent of the total, declined 33.9 per cent in quantity and 33.8 per cent in value.

The 1929 export trade in fresh vegetables aggregated $11,996,000, and that of canned vegetables $14,331,000, an increase of 17.2 per cent and 15.2 per cent, respectively. Canned asparagus continues to be the leading canned vegetable exported and showed the greatest gain, totaling 22,834,000 pounds with a value of $3,545,000, or a gain of 28.9 per cent in quantity and 31.1 per cent in value. The trade in canned soups shows a steady growth, the 1929 exports amounting to 28,751,000 pounds with a value of $2,723,000, compared with 28,279,000 pounds valued at $2,603,000 in 1928.

HYPOCHLORITE CORROSION

Is Cut by Addition Of Salts and Bases

By G. N. QUAM
Long Island University, Brooklyn, N. Y.

CORROSION of metals and alloys by chemical sterilizers such as sodium hypochlorite has long been a serious problem in the manufacture of dairy products, as well as in a number of other branches of food processing. The fact that additions of small quantities of various detergents, such as trisodium phosphate, caused a marked lowering in this corrosive action of hypochlorite on metals was noticed in an investigation made several years ago (*Butter and Cheese Journal*, April, 1928) when the effect of various combinations of sodium hypochlorite with cleaning agents was investigated.

The marked lowering in corrosive action caused by very small percentages of the detergents led to further inquiry. The quantities necessary were far too small to serve for the purpose of cleansing. A commercial preparation of trisodium phosphate and a "sodium hydroxide-sodium carbonate" preparation added in low percentage to the sodium hypochlorite solution retarded its corrosive action on pure nickel to a marked degree and similar retardation took place with block tin and stainless steel II (18 per cent chromium).

Table I shows the loss in milligrams per 3 square inches after exposure for 20 hours in hypochlorite solution (255 parts per million) alone and in the hypochlorite solution to which cleansing products had been added to the extent of 0.1 to 0.5 per cent. It is apparent that the addition of the very small quantities of the cleansing preparation greatly lowered the loss due to the corrosive action of the hypochlorite.

Table I—Average Loss in Milligrams per Square Inch of Samples in Sodium Hypochlorite Alone and With Detergents

		Sterilizer and NaOH-Na_2CO_3 Product			Sterilizer and a Na_3PO Product		
Metals	Sterilizer Alone Mg.	0.1 Per Cent Detergent, Mg.	0.3 Per Cent Detergent, Mg.	0.5 Per Cent Detergent, Mg.	0.1 Per Cent Detergent, Mg.	0.3 Per Cent Detergent, Mg.	0.5 Per Cent Detergent, Mg.
Block tin.....	1.1	0.3	0.4	0.4	0.3	0.4	0.1
Nickel.....	2.0	0.8	0.4	0.4	0.3	0.2*	0.2*
Stainless steel II...	0.1*	0.6*	0.6*	0.5*	0.0	0.0	0.0
Monel metal.....	2.4	0.2*	0.6*	0.6*	0.4	0.0	0.0

*Gain.

In order to obtain more complete and useful data pure trisodium phosphate, sodium carbonate, sodium hydroxide, and calcium hydroxide were used in place of commercial detergents, and observations were made on separate samples at 5-hour intervals. Separate sets of solutions and metals were prepared for each period. Table II shows the effect of 0.1 per cent and 0.5 per cent of the added product on the corrosive action of sodium hypochlorite solution (available chlorine, 255 parts per million). Due to its low solubility, only the 0.1 per cent solution of calcium hydroxide was used.

Table II—Average Loss in Milligrams per Square Inch of Samples in Sodium Hypochlorite With Pure Salts, and Bases

			Sterilizer Plus						
			Na_3PO_4		Na_2CO_3		NaOH		Ca-$(OH)_2$
Metal	Time in Hours	Sterilizer Alone, Mg.	0.1 Per Cent, Mg.	0.5 Per Cent, Mg.	0.1 Per Cent, Mg.	0.5 Per Cent, Mg.	0.1 Per Cent, Mg.	0.5 Per Cent, Mg.	0.1 Per Cent, Mg.
Nickel.....	5	0.6	0.1	0.1	0.2	0.3	0.0	0.2	0.2
	10	2.4	0.0	0.0	0.5	....	0.0	0.1	0.3
	15	....	0.2	0.0	0.6	0.3	0.1	0.1	0.7
	25	2.6	0.3	0.0	1.0	0.3	0.1*	0.1*	0.7
Block tin.....	5	1.4	0.1	0.1*	1.6	0.0	0.5*	....	0.1
	10	2.0	0.1	0.2	1.8	0.2	0.4	0.1	0.6
	15	2.7	0.2*	0.1	2.3	0.2	0.2*	0.3*	2.6
	25	....	5.3	1.9	6.1	1.4	4.8	0.0	2.7
Stainless steel II..	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	10	0.1*	0.1*	0.4	0.3	0.4	....	0.6	0.6
	15	....	....	....	....	....	....	....	....
	25	0.5	0.5	0.6*	0.9	1.0	0.4	0.0	0.2*

*Gain.

Just how much the added salts and bases retard the corrosion due to the sodium hypochlorite is obvious from the table. The addition of trisodium phosphate, sodium carbonate, and sodium hydroxide to the extent of 0.5 per cent, and calcium hydroxide to the extent of 0.1 per cent, lowers the corrosion of nickel and tin to a negligible value. The steel was notably resistant in all cases.

Experiments showed that a definite proportional relation exists between the stabilizing action of the salts upon hypochlorite solutions and the retardation of corrosion of the metals. Table III shows the effect of the addition of these salts and bases on the stability of sodium hypochlorite sterilizer in the presence of nickel, tin, and stainless steel II. The measure of stability is indicated by the loss in available chlorine in parts per million per 3 square inches of metal exposed. The solutions for the study over 5- to 25-hour periods were prepared as described for Table II.

In sodium hypochlorite solution alone nickel was badly corroded and the available chlorine dropped 232.5 parts per million in 25 hours. The loss indicated in Table II for nickel in the same solutions increased from 0.0 to 2.6 milligrams. With trisodium phosphate present to the extent of 0.1 per cent, however, the available chlorine dropped 17.0 parts per million and for 0.5 per cent trisodium phosphate, 9.9 parts per million. Table II indicates that under the same conditions the loss increased from 0 to 0.3 milligram and remained at 0 milligram, respectively. In other words, by the addition of as little as 0.5 per cent trisodium phosphate, the corrosion was practically arrested and the available chlorine remained practically constant.

Table III—Effect of Trisodium Phosphate, Sodium Hydroxide, and Calcium Hydroxide on the Stability of Sodium Hypochlorite

(255 Parts Per Million Available Chlorine)

		Loss in Available Chlorine, Parts per Million							
			Sterilizer Plus						
			Na_3PO_4		Na_2CO_3		NaOH		$Ca(OH)_2$
Metal	Time in Hours	Sterilizer Alone	0.1 Per Cent	0.5 Per Cent	0.1 Per Cent	0.5 Per Cent	0.1 Per Cent	0.5 Per Cent	0.1 Per Cent
Nickel	5	26.9	0.0	0.0	8.5	0.0	0.0	0.0	0.0
	10	160.2	2.8	2.8	18.4	5.7	1.4	0.0	14.2
	15	210.9	11.3	4.2	72.3	11.3	....	2.8	19.8
	25	232.5	17.0	9.9	146.0	22.7	24.1	11.3	56.7
Block tin	5	38.3	9.9	8.5	28.4	4.7	0.0	....	0.0
	10	60.9	....	17.0	36.8	15.6	0.0	2.8	8.4
	15	60.9	35.4	....	41.1	21.2	7.0	2.8	....
	25	....	95.0	51.0	130.4	48.2	46.8	15.6	22.6
Stainless steel II	5	8.5	0.0	0.0	....	5.6	4.2	0.0	1.4
	10	19.8	7.1	4.2	9.9	9.9	4.3	0.0	1.4
	15	25.5	11.3	8.5	11.3	12.7	9.0	0.0	1.4
	25	35.4	18.4	9.9	14.2	15.6	19.8	1.4	2.8

In the presence of tin, the retarding effect of trisodium phosphate was not so pronounced, but a 0.5 per cent solution lowered the loss of available chlorine and the loss of metal due to corrosion to a very small quantity. Table III indicates that of the 3 metals used, the change produced in the sodium hypochlorite preparation alone was greatest in the case of nickel. When trisodium phosphate was added, however, the lowering of the available chlorine was greatest in the case of tin. The presence of 0.5 per cent of sodium hydroxide produces the most favorable results of all the compounds added.

The results on the whole are very gratifying, for the addition of the very small quantities of the salts or bases greatly retarded the rate of corrosive action on metals and at the same time stabilized the chlorine-containing reagent. The former consideration is important from the standpoint of the life of the metal equipment and the latter from the standpoint of the bactericidal value of the sterilizer. The application to plant conditions is apparent. The metal surface should first be thoroughly cleaned and then treated with a sterilizer properly stabilized by such salts and bases as those indicated above, sodium hydroxide apparently producing, on the whole, the most favorable results. It has also been shown (G. N. Quam and S. N. Quam. *Am. J. Pub. Health* XIX, 737, 1929) that the rate of deterioration of the sodium hypochlorite preparation stabilized with sodium hydroxide is lower, under the condition of the experiment, than that stabilized with trisodium phosphate. When further observations are made, it may be found that the addition of the stabilizer has a favorable effect on the time factor for sterilization.

Preliminary tests indicate that the germicidal value of the hypochlorite is unimpaired by these additions, but it is hoped that bacteriologists will make further studies in this connection.

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Cellulose and Aluminum Cans Arouse Interest

ALTHOUGH no immediate revolution in the canning industry is promised by substitutes that have been developed for replacing the ordinary tin can, there is much interesting evidence of progress. Cost is, and probably will remain, a deterrent factor so long as tin prices remain at their present low level, because it is doubtful whether the modern housewife, grown accustomed to the tin container, can be persuaded to pay a premium for containers made of other materials. Novelty is a factor, however, that may encourage production on a commercial scale, particularly in packing high-grade products.

The belief that it was only a question of time until the chemists would produce an organic material to compete with tin plate in food containers has materialized in the introduction of a transparent cellulose product known as Macolite. This product is made by the Eastman Kodak Company under a special formula owned by F. T. MacColl and the Macolite Container Corporation. The manufacture and distribution of the new container is in the hands of the American Can Company, operating under a working agreement with the Macolite Corporation.

Macolite may be used as a transparent substitute for tin in the sides of round cans and top of flat tins and as a coating for the inside of tin cans to prevent the action of acid on the tin plate. It may also be used as a coating for paper, making it absolutely waterproof. Samples of the latter type of container used by the California Packing Corporation in canning fruit are about one-third the weight of the tin can ordinarily used.

Macolite is unbreakable and can be processed under a temperature of 230° F. The product differs from ordinary photographic film, although resembling it somewhat, inasmuch as it contains no camphor and hence is much less inflammable. It is reported to be about 33⅓ per cent more costly than tin. The amount so far produced has not been large because of difficulty experienced in manufacturing the necessary machinery to be installed in the various subsidiary plants of the American Can Company for making the cans.

Although lack of rigidity necessitates the use, in round cans, of a metal top and bottom, the main selling point of the Macolite container, aside from the fact that the product is visible to customers, is said to be its superior preservative qualities over enamel or ordinary tin plate. Full advantage may be taken of this feature by coating with Macolite the tin plate used in the top and bottom of the can.

Aluminum also is bidding for preference as a food container. The first experiment along this line was made in 1920, when the Norsk Aluminum Company, of Oslo, Norway, packed a number of cans of brisling and Mussa sardines. When opened last year it was found that no discoloration or blackening had occurred and that the containers were not corroded. Since 1920 the price of aluminum has decreased notably, and the Norwegian company has renewed its efforts to introduce aluminum cans among Norwegian fish packers. Fifty thousand aluminum cans have been made up and used for canned fish balls and other fish products, part of which has been exported.

It is reported that the difference in price between a can made of aluminum and one made of tin now amounts only to about one-eighth of a cent in Norway, but it is still an obstacle. It is also urged that printed labels may be dispensed with as aluminum may be embossed because it does not rust. The Norwegian canners are not converted to this idea, as elaborate paper wrappings are regarded as an effective agent of sales promotion.

BALED SEAWEED, the raw material for agar manufacture, arriving at the plant of the American Agar Company

AGAR: A Colloid of Importance

Takes Its Place

As a Food Adjunct

By H. D. MACKINNON
General Manager, American Agar Company
San Diego, Calif.

AMONG the people of the Orient, who utilize the products of marine plants to a considerably greater extent than the rest of the world, agar has a well-defined place in the diet. In the United States, its extensive use as a basis of solid culture media is known to every bacteriologist. Because it is entirely unassimilable, and because of its water absorptive capacity and jellying power at body temperatures it has been used as an ingredient in some "health" foods and in connection with anti-costive diets.

Recently, however, investigations have been made to determine the worth of agar as an auxiliary colloid stabilizer in ordinary, non-medicinal foodstuffs, such as confectionery, dairy products, canned meats, and baked goods. These experiments indicate that agar, because of its high gel strength and moisture-holding power, may, in certain cases, replace gelatin either wholly or in part, and serve as a substitute for gelatin where the latter, for one reason or another, is unsuitable.

Agar valued at about $2,000,000 is annually exported from Japan to Europe and the United States, but only one firm in the United States manufactures it direct from the red seaweed, the raw material from which the colloid is extracted.

As defined by the United States Pharmacopoeia, "Agar is the dried mucilaginous substance extracted from . . . species of *Gelidium* and closely related algae. Agar contains not more than 1 per cent of foreign organic matter and yields not more than 1 per cent acid-insoluble ash and not more than 16 per cent moisture." The name, sometimes given as "agar-agar," after the repetitive custom of the Malayan tongue from which it comes, means a jelly, and jellifying power is the most characteristic property of agar. Among the Japanese, it is known as *kanten* or *kanteen*. It has also been called vegetable gelatin and vegetable isinglass, both illogical names, although the former does express the resemblance of agar to its nearest analogue, animal gelatin. Both gelatin and isinglass, however, are nitrogenous animal derivatives; agar is a vegetable product allied to the carbohydrates and is practically nitrogen-free.

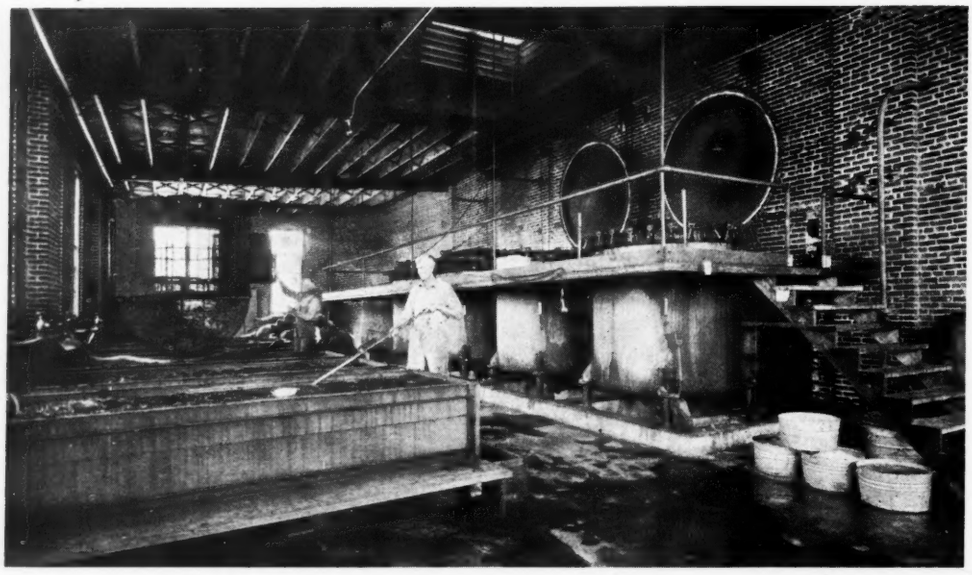
Although the exact chemical structure of agar is not known, Tressler states that it consists principally of a carbohydrate, a galactan, gelose, similar in properties to fruit pectin (Donald K. Tressler, "The Wealth of the Sea," the Century Company, 1927). The fact that its physical properties, water absorption, for example, are erratic and variable, points to a complex structure.

A proximate analysis of a typical sample of American agar showed:

	Per Cent		Per Cent
Moisture	18.41	Ether extract	0.19
Protein (Nx6.25)	1.12	Crude fiber	0.14
Nitrogen-free extract	76.94	Ash	3.20

A sample of American agar with 16.7 per cent moisture yielded 3.48 per cent ash. On analysis, this ash was found to contain: SiO_2, 0.93 per cent; Fe_2O_3 and Al_2O_3, 0.04 per cent; MnO, 0.01 per cent; CaO, 0.77 per cent; MgO, 0.41 per cent; B_2O_3, trace; Na_2O and K_2O, 0.23 per cent; CO_2, 0.03 per cent; SO_3, 1.03 per cent; P_2O_5, 0.01 per cent; Cl, 0.01 per cent; and undetermined, 0.01 per cent.

In its power to form a jelly with water lies the value of agar. It is insoluble in cold water, but swells and absorbs large quantities of it. When boiled gently for 3 to 5 minutes, it goes into a colloidal solution that sets to a firm jelly when cooled. The set occurs at much



THE COOK ROOM— Here the weed is washed for 24 hours, and then transferred by the basket shown on the left to the 1,200-gallon steam-heated digesters, where the long cooking necessary for satisfactory extraction is carried out.

higher temperatures than do gelatin solutions of the same concentrations. Three-fourths to 1 per cent solutions of agar will form fairly firm jellies at ordinary temperatures. The melting point of the gel is affected by its agar concentration, the source and method of manufacture of the agar, and the presence of impurities. Salts affect the melting point variously, some lowering and others raising it. Three per cent hydrochloric acid destroys the jelling power and causes inversion of the carbohydrate. Other mineral acids also cause inversion.

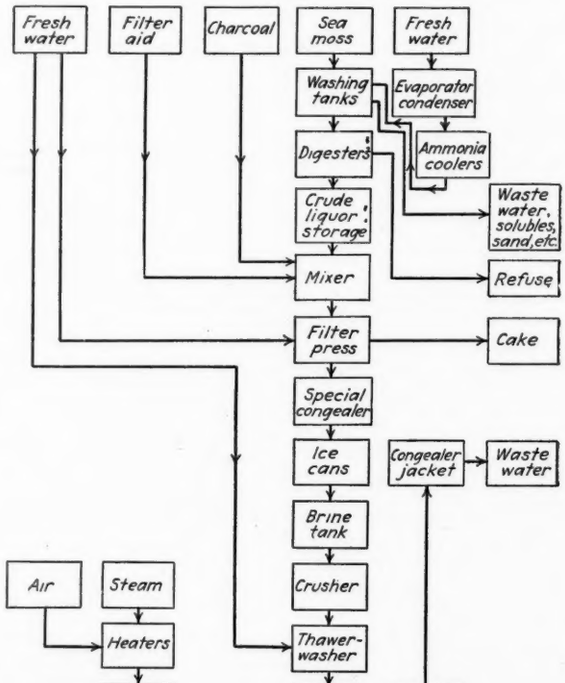
When pure, agar is odorless, tasteless, and harmlessly indigestible, in the sense that it is not absorbed in the alimentary tract. The salty taste and marine odor that are usually associated with Japanese agar are due to the presence of non-agar impurities resulting from insufficient washing. The fact that agar is not acted upon by the digestive juices, coupled with its water-absorptive capacity and jellying power at body temperatures, makes it valuable in the treatment of habitual constipation. The soft, bulky jelly formed in the intestines stimulates peristaltic action, and the greatly increased moisture content of the intestinal mass assists easy elimination.

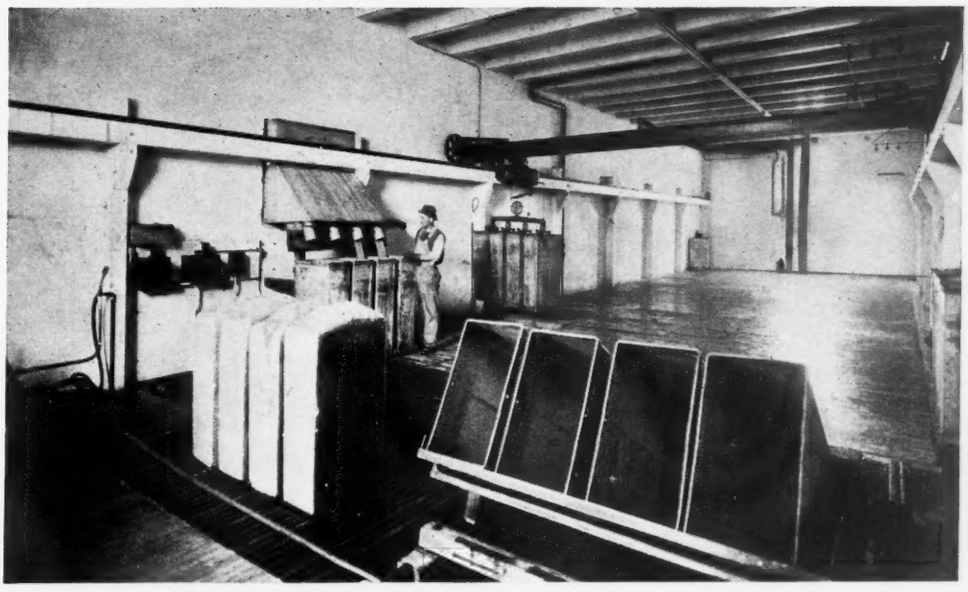
Agar is obtained from certain red seaweeds, belonging to the class of algae known as *Rhodophyceae,* and growing at depths from sea level to 60 feet. Those species producing the finest quality are *Gelidium cartilagineum, G. coulteri,* and *G. corneum.* Some species of the genus *Gracilaria* also are used in the Orient. All of these kinds of seaweed are indigenous to the California coast and to all of the shores washed by the Japan current.

As practiced in Japanese agar manufacture, the red algae are gathered from May to October with long-handled rakes or by diving from small boats. The weed is spread out on the beach to dry, and is then taken to factories back in the hills or mountains where the nights are cold and the winters long. Here it is cleaned by beating, pounding, and washing in cold, fresh water and then is bleached by drying in the sun. The bleached weed is boiled for 5 or 6 hours in open kettles with 50 times its weight of acidulated water. The solution is next strained into wooden trays and allowed to jell. The resulting jelly is cut into strips and placed out of doors on a cold night to freeze. By freezing, the agar is dewatered and, being insoluble in cold water, remains behind when the ice melts. The agar is then dried in the sun, tied into bundles, and marketed. It is evident that contamination is almost inevitable by this process, with its numerous exposures to the open air, and its crude methods of washing, straining, and separation from ice crystals.

At the plant of the American Agar Company at San Diego, Calif., research, technical control and modern machinery assure a purer and more satisfactory product for possible use in foodstuffs. The seaweed is purchased from fishermen who gather it as a side line to their regular occupation. Only species of *Gelidium* are gathered by these fisherman-divers, and the characteristic

AMERICAN PROCESS of agar manufacture shown by flow sheet

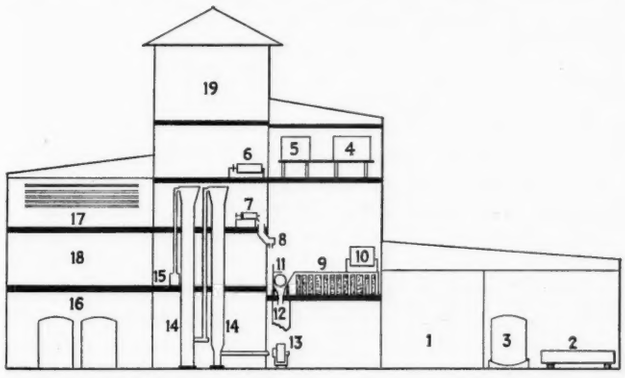




THE FREEZING ROOM—The workman is filling standard ice cans with agar jelly from the congealing machine in the adjoining room. In the foreground are several frozen blocks, each weighing about 300 pounds and containing 3 to 6 pounds of agar. When frozen, the ice crystals separate from the agar particles.

red color of these species makes control fairly easy. After drying, the weed is baled and shipped to the factory by truck.

Upon arrival at the plant, the material is given a thorough washing for 24 hours with fresh water in open vats. It is then forked into iron baskets and transferred



ARRANGEMENT OF PROCESSING OPERATIONS in American Agar Company plant shown diagrammatically. 1—Seaweed storage; 2—weed soaking and washing vats; 3—cookers; 4—crude liquor storage and settling tanks; 5—agitator tank; 6—filter press; 7—congealers; 8—gel hopper; 9—freezing tank; 10—ice dump; 11—ice crusher; 12—thawing tank; 13—separator; 14—dryers; 15—dried agar receivers; 16—steam boilers; 17—ammonia cooling coils; 18—Filter-Cel and charcoal storage; 19—laboratory.

by crane to one of five closed digesters, each holding about 1,200 gallons and heated by steam coils. A system of "counter-flow" extraction insures maximum separation of agar. This extraction process is carried on in three steps. The weed is first treated for 6 hours with liquor which has acquired a fairly high agar concentration from previous digestion of partly spent weed. The partly spent weed, after the first digestion, is treated for 8 hours with a more dilute agar liquor resulting from the final extraction process. In the final extraction process, the almost spent weed is treated with fresh water for a 12 to 14 hour period.

The liquor, after passing through its three steps, is drawn off, mixed with charcoal and Filter-Cel, and filtered in a small plate-and-frame press whose cloths have been previously coated with Filter-Cel pulped in water

From the filter press, the hot liquor goes to a storage tank and thence to the congealing machine.

This ingenious device consists of a nest of small tubes inclosed in a cylindrical jacket containing cooling water. The space at the head tube-sheet of the machine forms an inlet for the hot liquor which fills successive segments of the tubes by the pump pressure and which is controlled by a rotary disk-plate valve. The agar, cooled and congealed by the cold water bath around the tubes, is pushed out the discharge end by the pressure of the hot liquor behind it and is cut off by a rotary knife operating against the discharge end tube-sheet.

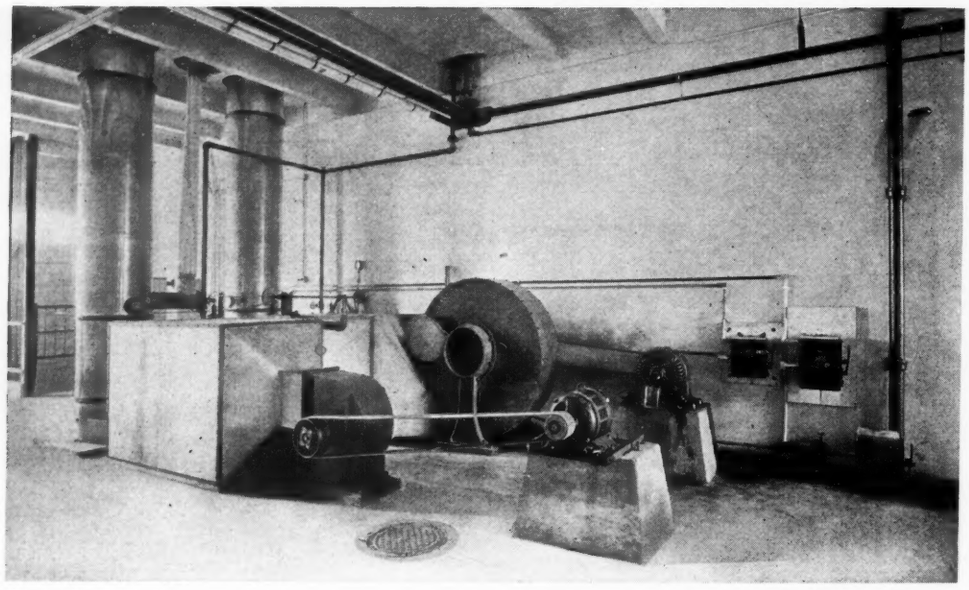
The small, short rods of jelly are discharged into a hopper and drop into standard ice cans in the freezing room adjacent. It is an interesting commentary that the freezing room was planned to operate as a commercial ice plant in the event that the expensive agar experiments turned out to be a failure—a sort of commercial insurance against loss if worst came to worst.

The cans of agar jelly are frozen just as ordinary ice would be, and the ice crystals separate from the agar particles during the process. The block of frozen agar, weighing about 300 pounds and containing 3 to 6 pounds of dried agar (worth about $10 to $20 at retail prices) is crushed and the crushed ice thawed out in tanks.

From the thawing tanks the mixture of ice water and agar flakes goes to a rotary vacuum filter. A further wash on the filter screen removes soluble impurities and leaves the flakes, carrying about 90 per cent moisture, ready for drying.

Drying the flakes is carried out in a unique dehydrating apparatus developed especially for the purpose. It consists of two aluminum cylinders, 35 feet tall and 3 feet in diameter. The agar flakes are delivered by a screw conveyor to the first cylinder, where they are kept suspended by a blast of air, previously warmed by steam coils, until they have become sufficiently dry, and therefore light enough, to pass over the top and into a fabric down-pipe alongside the drying cylinder. The semi-dry agar is taken from the fabric down-pipe by a second screw conveyor which also acts as a seal, into the second cylinder, where the dehydration is completed.

The agar as it comes from the drier is shipped either in bulk or in waterproof paper bags containing 5 pounds and about the size of the average cement sack. For



DEHYDRATING APPARATUS—Only the lower ends of the two 35-feet aluminum cylinders is shown in the illustration. A blast of heated air keeps the agar flakes suspended in the first cylinder until they become light enough to pass over the top into the fabric downpipe. From here they go to the second cylinder for final drying.

ordinary water absorption purposes the coarse agar is suitable, but for incorporation in food products or use in culture media, a finer product is desired. This is prepared by passing the coarse flakes through a Williams swing-hammer mill with a suction fan and cyclone collector. This finely ground agar averages 35 per cent through 100 mesh and the remainder through 60 mesh.

What has been gained over the simpler, cruder Oriental methods by using this highly mechanized equipment? A comparison of Japanese agar with that of American manufacture shows some striking differences:

Taste—American agar is tasteless and odorless. Japanese agar has a saline taste and a seaweed odor.

Color—Japanese agar is almost white when dry; American agar is slightly gray. The difference is due to the sun-bleaching process in the Japanese method of manufacture. Some objection to American agar has been raised on account of its color but the validity of this objection disappears when *solutions* of the two agars are examined; the Japanese agar solution has a yellow tinge while the American agar is nearly colorless though opalescent.

Foreign Matter—Examination of the shreds of Japanese agar shows numerous specks of foreign matter which do not occur in American agar. Thus, Japanese agar usually has to be purified before it is suitable for use.

Starch Test—Japanese agar gives a deep purple starch iodide reaction which is not obtained with American agar.

Water Absorption and Holding Capacity—Quantitative comparisons of this property of agar gave the results in Table I. The figures indicate the ratio of weight of water absorbed to weight of dry agar taken.

Table I—Water absorption of Japanese and American agars

Time and Temperature	Japanese	American
24 hours at 60-70° F.	8.5	9.0
4 hours at 98° F.	12.0	15.5
7 hours at 98° F.	13.5	19.0

To show that the water was held otherwise than mechanically the samples were centrifuged. The American agar had 25 per cent better absorbing and holding power.

Loss of Dry Substance on Prolonged Soaking—Samples of Japanese and American agars, containing the same weight of dry substance, soaked in water at room temperature for several weeks, gave the following results:

Table II—Loss in Dry Substance on Prolonged Soaking

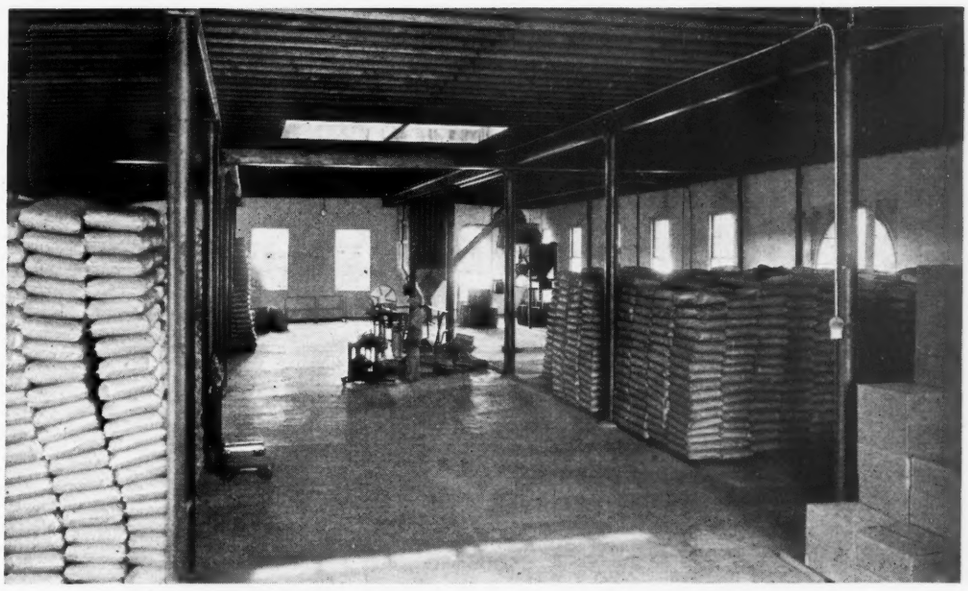
Days in Water	Loss in Dry Substance, Per Cent Japanese	American
6	40.8	22.8
10	46.3	27.1
14	48.5	28.3
21	50.0	30.5
33	51.8	32.0
47	53.0	33.2

This test is important in connection with the use of agar as a laxative. Since the object of using agar is to provide bulk in the intestinal tract, the less it dissolves the more efficient it will be in serving its intended purpose of stimulating peristalsis.

While agar has been used in the United States for many years as a culture medium by the bacteriologist, its use industrially is of comparatively recent origin. There is still much research to be done in connection with its application to foods.

The desirable quality of agar in food manufacture is that it jells readily and at relatively high temperatures without the assistance of any intermediate substance. On account of its high jell strength it has proved very economical. Experiments at the laboratory of the American Agar Company indicate that agar in breads and pastries, on account of its moisture retaining quality, keeps them fresh longer. The confectioner can make a healthful jelly candy with less sugar by using agar in $\frac{3}{4}$ to 1 per cent solution. In the preparation of malted milk drinks it provides a healthful body and acts as a stabilizer, especially in chocolate drinks and sirups in which it prevents the formation of sediment. One manufacturer of ginger ale and fruit sirups says it improves and sharpens the flavor.

In the manufacture of frozen dairy products, agar has been most successfully used in sherbets and water ices. It imparts a smoother texture to the products and also acts as a stabilizer. Dahlberg found that agar in water ices "made them smooth, not crumbly, and prevented the drainage of unfrozen sirup out of water ices in the hardening room." Also that, "unlike gelatin, agar acts quickly, and aging of the water ices or sherbets containing this stabilizer was unnecessary . . . it has little or no effect in this respect [imparting flavor or odor] upon water ices and sherbets" ("A Study of the Manufacture of Water Ices and Sherbets," A. C. Dahlberg, Bulletin No. 536, New York State Agricultural Experiment Station, September, 1926).



THE WAREHOUSE — A bag-filling and sewing machine is in operation in the center. The waterproof bags of the dried product, about the size of a cement sack, contain 5 pounds of coarse agar. For rendering agar suitable for food and culture uses, a swing-hammer mill disintegrates it to at least a 60-mesh fineness.

In connection with the use of agar in ice cream Dahlberg also states in a private communication: "The regelation of gelatin after whipping is of primary importance in affecting both body and texture. The influence on body, particularly in preventing crumbliness by the gel, is very essential, although this property has not been recognized. Since agar does not regel without redissolving by heat, it does not have this effect. Sufficient fat, 14 to 16 per cent, will hold the body together and overcome crumbliness, but most manufacturers do not wish to use so much fat. . . . . Of course some ice cream manufacturers may not object to crumbliness; then agar can be used, as it gives smoothness.

"In our trials we used the powdered agar mixed with sugar and added dry to the mix. Use 0.20 per cent agar. Then pasteurize at 160° for 20 minutes and while this probably does not thoroughly dissolve the agar, it seems to absorb water and renders the ice cream smoother. Half the regular amount of gelatin helps to give proper body and it can be added with the agar. Our tests have been very limited and with agar alone, confined chiefly to 16 per cent fat mixes. The agar prevents bleeding in such mixes and with the fat gives plenty of smoothness. In fact this ice cream is very choice."

Dahlberg has also studied the use of agar in the manufacture of Neufchatel type cream cheese and states: "The presence of agar or gelatin in the cheese was distinctly advantageous. . . . The use of agar had the disadvantage of requiring a higher temperature to dissolve it [180 to 185° F.] and its use had the advantage of making a firmer bodied cheese of improved slicing qualities. The use of agar is strongly recommended." He recommends dissolving the agar in the cream while pasteurizing at 180° for 10 minutes, using ½ per cent of agar by weight in the finished cheese (A. C. Dahlberg, *Journal of Dairy Science;* X, 114-115, 1927). One manufacturer making a ton of cream cheese a week has successfully adopted this method.

Agar has been highly recommended by manufacturers of mayonnaise, and Tressler (*op. cit.*) states that it is superior to gelatin for preventing the disintegration of fish and meat products in cans, as agar will retain its jelling power to a larger extent than gelatin after subjection to the high temperatures necessary in processing fish and meat foods.

The fact that agar sets rapidly and certainly at ordinary temperatures should make it popular for home use in preparing dessert and salad jellies. This is particularly true in warm climates, where frequently there is difficulty in making gelatin solutions set and in keeping them set after they have once jelled, as any chef or housewife can testify. The question of the relative food values of agar and gelatin in such mixtures becomes completely overshadowed by the convenience and time saving of the harmlessly inert agar and purely academic when the very minute amount of protein in gelatin jellies is considered.

On account of its beneficial physiological action it offers many intriguing possibilities in combination with other foods, and for this reason many breakfast and health food manufacturers are incorporating agar in their products. Agar has no food value in itself and highly concentrated diets may be modified by the addition of this bulky vegetable gelatin, which acts mechanically in a manner analogous to cellulose of vegetable foods and consequently can be considered an excellent roughage.

Much of the prejudice against the use of agar has arisen because of the quality of the usual product found in the market. The salty, marine taste and odor of such agar naturally precluded its use in products of high quality where delicate flavors were a desideratum. But the superior agar now made in America imparts no taste or odor to products in which it is incorporated and its higher gel strength makes its use more economical than was formerly the case. One Western candy manufacturer, for example, uses 20 parts of American agar in jelly candies in place of the 32 parts of Japanese formerly incorporated.

As far as the pure food laws are concerned, agar occupies the same position as any other gum or stabilizing material, such as pectin, gum arabic, or tragacanth; i.e., it must be declared on the label.

There is still much research to be done on agar and its uses. The first great step—the production of a tasteless, odorless agar of high gel strength—has already been accomplished. There is no reason to assume that agar will or can replace similar stabilizing substances in all cases; but its peculiar properties should recommend it for study to food manufacturers who desire a physiologically inert colloid stabilizer of high gel strength as an adjunct to their products.

Abstracts of Current Literature

HYDRATED SOLID CARBON DIOXIDE. Walter S. Josephson. *Refrigerating Engineering,* Vol. 19, p. 25-6; January, 1930.

The principal difficulty remaining in the commercial use of dry ice has been the necessity of providing separate means of maintaining a hydrated atmosphere for fish, fruits, and other foods which deteriorate by drying out. Experiments finally led to a successful system of freezing water and carbon dioxide together. The product, known as Hydrice, refrigerates on a higher temperature plane than dry ice because it has a layer of water snow which acts as an insulating blanket. It supplies moisture to the atmosphere, absorbing water continually from the cake. This gives a humidity condition which prevents drying out of moist foods. It makes possible the use of cheap throw-away shipping containers, and permits long-distance shipment of perishables without re-icing. J. C. Goosmann, in discussion, questions the feasibility and practical utility of the invention. His objections are answered by the author. See also J. C. Goosmann, Vol. 18, 155-9 (1930), on the production and uses of solid carbon dioxide.

* * *

QUICK FREEZING. S. C. Bloom. *Refrigerating Engineering,* Vol. 18, p. 165-9; December, 1929.

Earlier methods of sharp freezing of meat and fish products had several serious drawbacks, including weight loss, adverse effect on appearance, cell rupturing in air frozen foods, and loss in food value. Demand for a hard chilled packaged form of fish led to further developments, resulting in the modern frozen filet products and the solid-block type of packaged fish. The solid-block product requires the use of a double-contact freezer; frozen filets are produced by a single-contact freezer. The principal double-contact freezers are that of Clarence Birdseye and the Kolbe "diving-bell" freezer. The principal systems for freezing individual fish filets are the relatively new Cooke plate system, and the Kolbe floating-pan system. The latter utilizes a continuous pan floating raceway method, which requires no conveying machinery and can be adapted to give large capacity in small space. A European single-contact system now being introduced in this country is that of Zarotschenzeff, in which the filets are frozen by a fog or spray of brine. It is claimed that the process has the advantages of direct brine immersion freezing, without the disadvantage of salt penetration into the product. The demand for quick freezing is such that further development is urgently needed; and attention must be given to the engineering problems of very large capacity units. Diagrams and photographs of the apparatus for some of the quick freezing systems are shown.

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BOTTLED CITRUS JUICES. H. H. Overstreet. *Fruit Products Journal,* Vol. 9, p. 150-2; January, 1930.

The Vitavac process, an electro-vacuum method of packing fresh fruit and vegetable products without loss of vitamin potency, is now being commercially applied to production of bottled undiluted juice of tree-ripened citrus fruits. Two packing plants are in operation, one in Florida and one in California. An orange butter product, also retaining the original vitamin content, is also being made. The orange juice retains the color, aroma, and taste of the fresh juice and can be kept for about 3 days without spoilage after being opened. On account of its vitamin C potency it is useful for infant feeding, to provide an anti-scorbutic factor in the diet. It also has all the uses to which fresh orange juice is commonly put. The process has been developed to the point where production costs permit marketing the products at prices which enable them to compete with fresh citrus fruits. Although the first commercial utilization is limited to citrus fruits, the process is equally applicable to other fruits and to numerous vegetables, and further developments along these lines are anticipated.

* * *

GRAPE SIRUPS. P. H. Richert. *Fruit Products Journal,* Vol. 9, p. 149; January, 1930.

An experimental program is under way at the University of California to ascertain the cause of darkening of grape sirups. Storage tests will still be in progress through much or all of 1930, but results already obtained permit some interesting conclusions. Many have considered oxidation to be the principal cause, but it now appears that oxidation has only a minor influence. In other sugar sirups it has been observed that proteins, or the amino acids derived therefrom, accelerate darkening. In the study of grape sirups the results are not yet conclusive, but point toward the probability that proteins or amino acids are not responsible. The two factors which have been observed to be most influential are temperature and hydrogen ion concentration, or "active acidity." Although the acidity has a pronounced effect, most of the darkening occurs just after the sirup has been neutralized. Storage temperature apparently has a greater effect than acidity; there is much darkening at 100° F., but practically none at 32° F. Comparisons with different sirups indicate, however, that rising temperature merely accelerates darkening and is not the actual cause. Sulphur dioxide is useful to prevent darkening; as little as 20 parts per million has an appreciable effect. It should not be used in such high concentrations as to prevent darkening altogether, nor can a darkened sirup be bleached with sulphur dioxide.

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CARBON DIOXIDE PRESERVATION OF MEAT AND FISH. D. H. Killeffer. *Industrial and Engineering Chemistry,* Vol. 22, p. 140; February, 1930.

Meat and fish can be kept fresh longer when refrigerated in a carbon dioxide atmosphere than when refrigerated in air. The pH value of meat and fish change, which indicates that carbon dioxide is absorbed. Also, the growth of common bacteria is greatly impeded, if not actually stopped, by the presence of dissolved carbon dioxide in the culture medium. On account of the increasing importance of solid carbon dioxide as a commercial refrigerant, further work on the subject is desirable.

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PALM KERNELS. A. Gehrke. *Chemische Umschau auf dem Gebiete der Fette,* Vol. 37, p. 1-3; Jan. 15, 1930.

Palm kernels are bought on the basis of oil content, the standard in the Liverpool contracts being 49 per cent. The Liverpool analysis governs the sale price; but if either seller or buyer doubts the analysis he can have another analysis by a different Liverpool laboratory. The average of the two determinations then governs the price. Check determinations by a purchaser (a German oil mill) over a long period revealed discrepancies amounting to an overpayment of about 0.5 per cent., or under the most favorable calculations nearly 0.3 per cent. An investigation of sampling and analytical methods was made in an attempt to locate the source of the discrepancy. The practice of shipping sample kernels in coarse jute sacks is believed to be mainly respon-

sible for analytical losses. Dusting tests showed appreciable loss in the form of dust; and drying-out of the kernels probably accounts for part of the loss. A recommendation is made that samples be shipped in waterproof containers instead of in jute bags. Some suggestions also are made for improvements in the analytical procedure.

* * *

FERMENTATION TOLERANCE. Earl B. Working. *Cereal Chemistry,* Vol. 6, p. 506-12; November, 1929.

Determination of fermentation gives, in some respects, better information than any other test for flour quality; but it carries with it a considerable risk of misinterpretation. This is particularly true if there is not sufficient consideration of the separate influences of the two chief factors necessary for good volume and loaf texture; namely, rate of gas production and physical condition of the dough. The importance of separate consideration of these two factors has been recognized for some years in Europe, but is only beginning to receive attention in America. Therefore a study has been made of these two factors. It appears that best possible volume and texture are obtained only when the peak of the gas production curve almost or quite coincides with the peak of the dough-condition curve. The latter is the resultant of a composite effect of many factors, most of which are continuously changing during the dough fermentation. It also appears that a wide fermentation tolerance requires that a wide portion of the high part of the dough-condition curve shall occur within the period of adequate gas production. Adjustment of needed conditions has long been practiced empirically, with more or less success; but modern competitive conditions in the baking industry demand certainty. Further study of factors influencing dough condition is the principal need for the possibility of certain prediction of optimum results.

* * *

EVAPORATED MILK. Byron H. Webb and George E. Holm. *Journal of Dairy Science,* Vol. 13, p. 25-39; January, 1930.

Since consumers judge evaporated milk partly by its color, it is important to know the effect of various production factors on the color of the product. Color standards have therefore been developed, expressed in the numerical units of the Munsell color system, and a study has been made of the effect of manufacturing conditions. Heat tends to darken color, whether applied during forewarming, sterilizing, or storage; and the thermal effect is catalytic. The darkening due to heat affects all three of the psychological aspects of color—namely, brilliance, chroma, and hue—if the heat is applied during sterilization; but time and temperature of storage deepen color only by increasing chroma. Some difficulty was encountered in developing reproducible color standards exactly matching colors of actual commercial samples of evaporated milk. Success was attained by suitable blending of ferric chloride and potassium dichromate, using calcium carbonate as a white pigment base. The only important neutralizer having an appreciable effect on color of evaporated milk is sodium bicarbonate. When the neutralization is properly conducted to give maximum stability, it also gives minimum darkening of the product. Among the operating conditions which affect color, the most important is the time-temperature relation during sterilization. Since this relation is practically constant in production practice, it should not be a source of lack of uniformity.

* * *

BUTTER IN ICE CREAM. Randall Whitaker. *Journal of Dairy Science,* Vol. 13, p. 1-7; January, 1930.

In some places butter is cheaper than sweet cream as a source of milk fat for ice cream manufacture. Comparisons have shown that butter mixes are more viscous and do not swell as much or as rapidly, although no reason is known for these differences from sweet-cream mixes. An experimental study has therefore been made of the effect of butter on the freezing properties of ice-cream mixes. It was observed that presence of buttermilk solids had a stabilizing effect in emulsifying the fat; clumping occurred in the homogenizer with butter mixes, but not with cream mixes. There is some evidence that the substance which acts as stabilizer is lecithin; for instance, egg yolk, which is rich in lecithin, is an effective stabilizer in homogenizing ice-cream mixes. Addition of buttermilk solids to butter used in ice cream improved the homogenizing and freezing behavior, thus giving strong support to the supposition that absence of these solids is responsible for the inferior freezing properties of butter mixes. Tables of data are given on amount and rate of swelling, basic viscosity of the aged mixes, and the lecithin content of whole milk, cream, skim milk, buttermilk and two varieties of butter. Cream contains nearly three times, and buttermilk nearly twice as much lecithin as raw sweet cream butter, which in turn contains more lecithin than pasteurized, ripened cream butter.

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MOLASSES DISTILLERY BYPRODUCTS. E. Humboldt. *Facts About Sugar,* Vol. 25, p. 18-9; Jan. 4, 1930.

The byproducts of a distillery using molasses include carbon dioxide, yeast, distillery slop, and the minerals contained in the slop. About 75 per cent of the evolved carbon dioxide can be profitably recovered (about 5 pounds per gallon of absolute alcohol produced), but the gas must be thoroughly freed from vapors of alcohol, aldehydes, esters, and fusel oil. If not so purified, it retains an odor which is objectionable whether the gas is used in beverage production or for making dry ice. Separation and recovery of the yeast is worth while only in exceptional cases; in ordinary practice the yeast is allowed to run into the still along with the fermented mash. The slop, or vinasse, is worked up for its potash content, by burning it and utilizing the ash. The slop must be concentrated, preferably in a multiple-effect vacuum evaporator, to a concentration (36 to 40° Baumé) at which it will burn without outside heat. The ash is rich in potassium oxide and is sold as fertilizer. Another method of utilizing slop is destructive distillation, with recovery of the products. This is a difficult process, but profitable if properly carried out. The products obtained include acetic acid, methanol, acetone and acetone oil from the volatile portion, and a charcoal residue. The mineral matter remains in the charcoal and can be leached out.

* * *

THE COMPARATIVE RICKETS-PRODUCING PROPERTIES OF CORN, WHEAT, AND OATS, AND THE EFFECT OF IRRADIATION AND MINERAL SUPPLEMENT. H. Steenbock, A. Black and B. H. Thomas. *Journal of Biological Chemistry,* Vol. 85, p. 585; January, 1930.

In general, the cereals rank in antirachitic potency in the descending order of wheat, rolled oats, corn. Addition of 1 per cent calcium carbonate produced the best bone, while small quantities of added phosphoric acid had no appreciable effect on bone composition. Irradiation of the cereals with light from quartz mercury vapor lamps made them approximately alike in antirachitic potency. Heavier bone was produced by the irradiated cereals than with the non-irradiated cereals, but without calcium supplements the percentage of ash was not increased.

* * *

PRESENT DAY KNOWLEDGE OF FOODS. E. V. McCollum. *Northwestern Miller,* Vol. 161, p. 463; Feb. 5, 1930.

Researches of the past 20 years have shown that the adequate diet may be regarded as made up of approximately 35 relatively simple substances, which are enumerated. One of the lines of greatest progress in food research is the so-called biological assay of foods. Deficiency foods are no longer condemned but are utilized effectively by combining proper supplements with them. The leaf of the plant has great dietetic superiority over the grains, tubers, roots, and fruits. The potato is especially valuable for its alkaline ash and for its starch and vitamins. Of great importance are the protective foods, milk and the leafy type of vegetables. The important sources of the known vitamins are enumerated and the prevention of rickets discussed in this most interesting and concise article.

Critical Book Reviews

THE MOST NEARLY PERFECT FOOD. By Samuel J. Crumbine and James A. Tobey. The Williams & Wilkins Company, Baltimore, Md. 292 pages. Price, $2.50.

THIS frankly protagonistic treatise on milk and its place in the diet is compiled by the general executive of the American Child Health Association and by a former secretary of the National Health Council, two of the most important bodies in social work. Many in the food industries will recall Dr. Crumbine as the quondam health officer of Kansas.

The ten chapters cover the history, production, practical use, sanitation, and dietary functions of milk and its products. Designed for the lay reader, it will be of especial interest to those engaged in the manufacture of the concentrated forms of milk, because of its insistence upon the importance of those products, both nutritionally and economically. Seldom do we see in print disinterested statements to the effect that "evaporated milk is the cheapest form of milk now on the market," with a few explanatory words substantiating the claim.

Because of the prominence of the organizations with which the authors are connected, the work will undoubtedly be accepted without serious argument. In consequence it is perhaps unfortunate that certain topics were treated in partial fashion. For example, pasteurization is defined solely in terms of the holding system (30 minutes at 145° F.) no reference being made to flash pasteurization, or momentary and continuous treatment of a thin film of milk at 160° to 180° F. By this method the cream line is destroyed and the flavor of pasteurization intensified, facts that render it unsuitable for use with market milk. Although flash pasteurization has never won the complete approval of the health authorities, it is known to be used widely in butter making and elsewhere in the industry, and its omission detracts from the comprehensiveness of the work.

In addition to much material devoted to the food value of milk, there are interesting discussions of the calorie value of many common foods, calorific requirements of children, normal weights for various heights and ages, the vitamins and their occurrence in common foods, food selection, milk-borne epidemics, the standard milk ordinance, percentage composition of certain cheeses, percentage composition of milk of several breeds of cows, percentage composition of milk of various animals (asses' most like human milk), and the per capita consumption of milk in various parts of the world, in which the United States ranks fifth.

R. G. GOULD.

* * *

TRANSACTIONS. Public Health Bulletin No. 191, Treasury Department, United States Public Health Service, Washington, D. C.

THOSE who are interested in the public-health aspects of the dairy industry will find a brief résumé of the more important trends in pages 58 to 74 of this bulletin of the twenty-sixth annual conference of state and territorial health officers with the United States Public Health Service. The subjects discussed are: Recent Court Decisions on Milk; Amendment to Interstate Quarantine Regulations on Milk; Milk Control Problems; Tuberculin Testing of Cows.

* * *

MEAT THROUGH THE MICROSCOPE. By C. Robert Moulton. The University of Chicago Press, 1929; 528 pp. Price $5.

IN READING "Meat Through the Microscope" one is conscious of the influence of Louis Pasteur reaching across the decades that have elapsed since his death, and the reader who remembers the biography of Pasteur by his son-in-law, Renee Valle-Radot, will suspect the existence of a well-read copy of that worthy book in Dr. Moulton's library. This is as it should be, for all researchers should study Pasteur.

The title of this book is a trifle unfortunate in its apparent indication that a histological treatise lies between its covers, for less than 30 pages are devoted to the microscopy of meat. The rest of the book relates to the keeping qualities of meats, their curing, spoilage, and the science and manufacture of all the various byproducts of the packing industry, as viewed through the eyes of the chemist-bacteriologist. It is written in words that the layman can understand and, in thought-provoking manner, raises a storm of questions and proceeds to answer them by quoting extensively from technical data, some of which have hitherto been available only to members of the Institute of American Meat Packers.

Much of the data presented has the advantage of being derived from plant scale experiments, interpreted by practical men long familiar with the processes under study, thus giving the book the stamp of authority. It is no mere assembly of academic lore. All who are interested in technical advance in the processing of foods will be glad that the author and his associates have been able to go so far in raising many of the operations of the abattoir from semi-secret rituals to scientifically controlled processes.

Certain parts of the book are of particular value and deserve mention, particularly the chapter on meat spoilage. Foremen as well as superintendents can well afford to make a careful study of this particular chapter, for from it will come a much keener appreciation of the dollars and cents value of sanitation and bacteriological cleanliness. In this book is an accumulation of knowledge that should be of value not only to the packing industry but to many other branches of food manufacture.

L. V. BURTON.

* * *

THE THEORY OF EMULSIONS AND THEIR TECHNICAL TREATMENT. By William Clayton, With Foreword by Prof. F. G. Donnan. Second Edition. P. Blakiston's Son & Company, 1928. 283 pages. Price, $4.50.

IN his preface Dr. Clayton states that it has been his desire to appeal to technical workers and to give general principles rather than exhaustive treatment. To the reviewer this volume represents an admirable digest of the scientific literature, interpreted for busy technical men in many fields widely separated commercially but closely linked scientifically. Dr. Clayton's text summarizes recent views on the theories of emulsions and bears throughout the stamp of being written by one to whom theory and practice in the subject are equally familiar.

Besides the text there are three valuable appendixes: an excellent condensed account on the theories of emulsions stabilized by solid particles, by Prof. W. Ramsden; a list of emulsifying agents for preparing technical oil and water emulsions, with a bibliography; and a bibliography classified by methods for the separation of technical emulsions under a number of convenient headings for ready reference. Finally, there is a selected bibliography conveniently grouped by subjects, each alphabetically arranged, on general theory, properties of emulsions, nephelometry, interfacial tension, saponification, biology and pharmacy, dairy chemistry, and others. There also are author and subject indexes.

The book is small, about 6 x 9 inches, and of less than 300 pages. Numerous footnotes to scientific and patent literature are found on almost every page. It is, in fact, difficult to criticize this little volume, on which quite plainly a great deal of effort has been spent to make it of real service. The printing is excellent and no typographical errors were found.

H. W. VALTEICH.

◂◂ What's on Your Mind?

More About Quick Freezing

To the Editor of FOOD INDUSTRIES:

Your editorial in the February issue entitled "Frozen Food Manufacturers Are Facing a Real Problem" contains much good sense, and raises some questions which deserve serious thought on the part of us who are engaged in merchandising frozen foods.

You do not raise the question as to whether the economics of these several food industries call for freezing. In the fish business, where freezing has had its most conspicuous success, a set of conditions exist which make freezing not merely an interesting new development but a dire necessity. Our greatest demand exists in winter; our greatest production in summer; the product is highly perishable—too perishable, in fact, for satisfactory delivery even for immediate consumption in the non-frozen condition. It is, therefore, logical that this development should arise first in the fish industry, where it was most needed. But can we reason, from the modest success we have had with it in the fisheries, that it is a godsend to all perishable food industries? Do parallel conditions exist in the meat, fruit, berry, vegetable, and poultry industries which make freezing equally necessary—or sufficiently important to justify the higher cost of freezing and maintaining freezing temperatures throughout distribution?

These questions must be answered by each branch of the perishable food industry for itself. The present writer earnestly hopes that freezing will do for other industries what is doing for ours, because we are sure that our way of distribution will be easier when there is a variety of perishable foods, and not fish only, distributed by the same system.

If freezing is to be applied to a great variety of foods for retail distribution, it seems to the writer that there is but one logical method of supplying store refrigeration: namely, that the store provide its own refrigerator for freezing temperature, just as it now does for cool temperature, without any string tied to it by a manufacturer of food products. These strings of control are a nuisance to store owners and manufacturers alike. A machine requiring service, care, and attention should be in the hands of its owner and he alone should be responsible for it. It is a natural part of his fixtures necessary for doing business, and he should provide the capital for it. He should be free to buy from competing manufacturers, which he will be if he owns his cabinet, and competition will be a useful force in developing perfection and economy in this new art.

But how to get this going? Our company has already installed several hundred cabinets of different types in retail stores as a start. What is now needed is more goods in these boxes, a variety to split the overhead. A co-operative move should be made between some of us who manufacture, the refrigerator cabinet people, and the chain stores, to nurse the baby through infancy, after which it will have to take care of itself.

Yours very truly,
H. F. TAYLOR
Vice-President for Scientific Research
The Atlantic Coast Fisheries Co.

* * *

To the Editor of FOOD INDUSTRIES:

You will note listed below names of some of the manufacturers of refrigerated display cases that have been brought to our attention, which may be of interest in connection with the editorial that appeared in your February issue:

American Foundry & Equipment Co., Mishawaka, Ind.
Banta Refrigerator Co., Clearfield, Pa.
Blazek & Co., Chicago, Ill.
Bohn Refrigerator Co., St. Paul, Minn.
Cincinnati Butcher's Supply Co., Cincinnati, Ohio.
Cincinnati Refrigerator & Fixture Works, Cincinnati, Ohio.
Climax Electric Refrigerator Co., Clinton, Iowa.
Coast Case & Fixture Corporation, Seattle, Wash.
Commercial Refrigerator Mfg. Co., Los Angeles, Calif.
Paul J. Daemicke Co., Chicago, Ill.
Downing Mfg. Co., Downing, Wis.
Dry Kold Refrigerator Co., Niles, Mich.
Elkins Refrigerator & Fixture Co., Elkins, Wis.
H. Ehrlick & Sons Mfg. Co., St. Joseph, Mo.
Electro Kold Corporation, Spokane, Wash.
Frigidaire Corporation, Dayton, Ohio.
Ford Refrigerator Co., So. Jacksonville.
Federal Refrigerator Co., Milwaukee.
Gurney Refrigerator Co., Fond du Lac.
General Electric Co., Cleveland, Ohio.
Gustav J. Gruendler Mfg. Co., St. Louis.
Gloekler Bernard Co., Pittsburgh,, Pa.
General Refrigerating Co., Beloit, Wis.
C. V. Hill & Co., Inc., Trenton, N. J.
Hussmann Refrigerator Division, St. Louis, Mo.
B. B. Hanak Co., Chicago, Ill.
Holcomb & Hoke Mfg. Co., Indianapolis.
Herrick Refrigerator & Cold Storage Co., Waterloo, Iowa.
Illinois Refrigerating Co., Morrison, Ill.
Koch Butchers Supply Co., Kansas City, Mo.
Ligonier Refrigerator Co., Ligonier, Ind.
McCray Refrigerator Sales Corp., Kendallville, Ind.
Northey Mfg. Co., Waterloo, Iowa.
National Store Fixtures Co., Denver.
New England Store & Fixture Co., Providence, R. I.
Ottenheimer Brothers, Inc., Baltimore.
Omaha Fixture & Supply Co., Omaha.
C. L. Percival & Co., Des Moines, Iowa.
Puffer-Hubbard Mfg. Co., Minneapolis.
Smith-Doris, Los Angeles, Calif.
Smoot-Holman Co., Inglewood, Calif.
C. Schmidt Co., The, Cincinnati, Ohio.
Servel Sales Inc., Evansville, Ind.
Savage Arms Corporation, Utica, N. Y.
Sherer Gillett Co., Chicago, Ill.
Viking Refrigerators, Inc., Kansas City, Mo.
Weber Showcase & Fixture Co., Los Angeles, Calif.
Warren Company, Atlanta, Ga.

This list is fairly representative of a number of refrigerated case manufacturers who have expressed to us an interest in the developing of a case capable of maintaining temperatures required to meet the demands of frosted foods.

We rather doubt whether co-operative effort in the installation of refrigerator display cases will solve the problem you have discussed. Such a solution would no doubt be fairly prompt, but it seems to many of us that the problems presented are too big to be solved promptly by any one method. There is always much educational work to be done among consumers before new methods can be adopted successfully.

To the extent that retailers, who have up-to-date refrigerating facilities, will be able to give a better service to their customers (and we believe that is the way it will work out), competition will cause the installation of refrigerated equipment on an increasing scale. Similarly, competition among the manufacturers of equipment will be the means of getting the equipment into the retailers' hands at the lowest possible cost.

You will understand, of course, that these are only the individual views of some of the people in our organization. All are agreed that it will take time to bring about widespread substitution of new methods for old.

Very truly yours,
SWIFT & COMPANY
George E. Putnam,
Manager, Commercial Research Department

▼ ▼ ▼

Government Publications

Equipment for City Milk Plants. U. S. Department of Agriculture Circular 99; 5 cents.

Tariffs on Canned Foods in Europe. Bureau of Foreign and Domestic Commerce Trade Promotion Series 85; 45 cents. Issued as Part II of Handbook of Foreign Tariffs and Import Regulations on Agricultural Products. Contains translations of pertinent portions of pure food laws of practically all the countries of Europe.

Salmon—An Economical and Valuable Food, by Ward T. Bower. Bureau of Fisheries Economic Circular 69; 10 cents.

Frozen Pack Method of Preserving Berries. U. S. Department of Agriculture Technical Bulletin 148; 10 cents. Discusses use of this method in the Pacific Northwest.

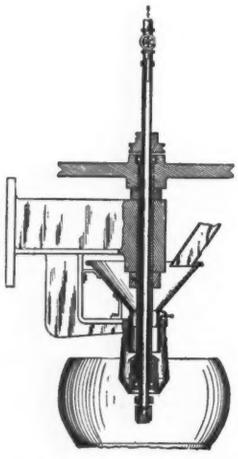
Production of Clean Milk, by Earnest Kelley. U. S. Department of Agriculture Farmers' Bulletin 602, revised with slight changes; 5 cents.

Milk-Plant Arrangement, by C. E. Clement and others. U. S. Department of Agriculture Technical Bulletin 153; 15 cents. Discusses effect of milk-plant arrangement and methods of operation on labor requirements.

Soy-Bean Utilization, by W. J. Morse. U. S. Department of Agriculture Farmers' Bulletin 1,617; 5 cents.

Selected Patents

Mixer That Avoids Lumps—Harold Kenneth Wilder, Battle Creek, Mich., to Kellogg Company, Battle Creek, Mich. No. 1,741,176. Dec. 31, 1929—The chief difficulty in mixing a granulated solid with a liquid has lain in the tendency of the liquid to agglomerate the particles of the solid. This is avoided by applying the liquid to a stream of powder in a mist or very fine spray, so that each particle receives only a thin coating of the liquid, not sufficiently thick to cause its adherence to adjacent particles. As shown in the drawing, the powder passes down the outside of a revolving shaft and is distributed just above a spraying collar from which the liquid, which enters through the hollow shaft, is being sprayed. Both the quantity of powder and the quantity of liquid flow are easily adjustable. Ordinary speeds of rotation for operation of the unit ranges between 2,000 and 10,000 r.p.m. The apparatus is said to be suitable also for combining immiscible liquids prior to emulsification.



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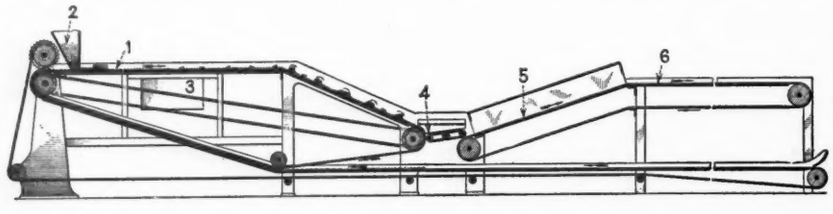
Enrobing Candy With Nuts—Herbert J. Melville, Chicago, Ill., to Curtiss Candy Company, Chicago, Ill. No. 1,743,227. Jan. 14, 1930—In coating candy bars with nuts and similar substances, it is desirable to cut down the amount of hand operations, and at the same time secure a return of the surplus embedding material. In the apparatus here shown, the nuts flow upon the belt, *1*, from the conveyor, *2*. Candy is dipped in chocolate in the tank *3*, and placed upon the layer of nuts. As it comes to the sloping portion of the belt, a number of rolls tumble the bar to give an even coating. At *4*, the coated bars are picked from the first conveyor, but the excess nuts fall to the lower belt and are returned to the beginning of the cycle. After traveling through the closed portion of the conveyor *5*, in which temperature conditions may be regulated if desired, the candy bars are manually pressed to the proper shape as they pass along the horizontal portion, *6*. Any additional surplus of nuts falls to the lower belt and is returned.



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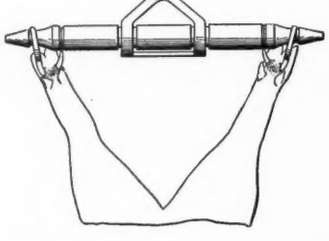
Grinding Spray-Dried Gelatine—Andrew Neff, Pittsburgh, Pa., to Charles B. Knox Gelatine Company, Inc., New York City. No. 1,735,356. Nov. 12, 1929—The most economical method of obtaining gelatine in a solid and finely divided condition, it is said, is by atomizing the gelatine liquor in a stream of warm air, similar to the usual spray-drying process. Objection to this method of preparation has been due to the bulkiness of the product, which has a specific volume of 14 compared to a figure of *2* for the ordinary product that has been dried solid and then ground. It is asserted that by subjecting the bulky spray-dried product to grinding, the specific volume is easily reduced to about *2*, and the product is more finely divided, all in a shorter time than that required for mill grinding of dried solid gelatine. Ball mills, attrition mills, or other types are used for the grinding.

* * *

Suspending Animal Carcasses—Maurice D. Helser, Ames, Iowa. No. 1,743,346. Jan. 14, 1930—Hog carcasses ordinarily are suspended while being dressed by means of hooks inserted in incisions in the hind legs between the hock and fetlock joint. This method not only renders this portion of the carcass unfit for consumption, due to entrance of water, etc., but makes cleaning of the leg difficult and often results in severing of the flexor tendons, which causes the carcass to drop from the hooks. This difficulty is said to be overcome by the method of support here shown, in which each hind foot is perforated transversely between the chief digits and the accessory digits by means of a sharp pointed instrument. Hooks are then placed in the holes, and these in turn are hung over the gambrel so that the pointed ends fit into annular grooves as shown.



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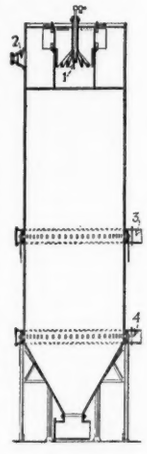
Spray Drying Sugar Juice—Walter H. Dickerson, East Orange, N. J., to Industrial Waste Products Corporation, Dover, Del. No. 1,739,064. Dec. 10, 1929—A sugar product, said to be of greater dietetic value than ordinary refined sugar, because it contains natural non-sugar constituents of the juice, is made by spray drying. After mechanical impurities, such as bits of cane, are filtered from the unconcentrated juice of the cane or beet, the liquid is introduced into a drying chamber in a finely divided state. As carried out in the apparatus shown in the illustration, juice enters through the nozzle *1* under a pressure of more than 100 pounds per square inch. It is dried by hot gases entering at *2*, the temperature at the completion of evaporation being about 200° F. As the product falls down the chamber, cooling gas entering at *3* and *4* chills the product to about 125° F. and prevents it from melting or forming a solid mass at the bottom. The product is said to be practically colorless when made from cane juice, but beet juice must be initially filtered to remove color.



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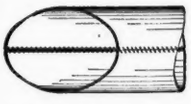
Double-Layer Sausage Casing—Frank H. Hoy, Milwaukee, Wis., to Cudahy Brothers Company, Milwaukee, Wis. No. 1,741,239. Dec. 31, 1929—Certain types of sausage, such as the "Genoa" variety, usually are made with a casing of weak and fatty intestinal material such as hog intestines, an expensive and tender casing. To provide a relatively strong casing without altering the appearance of this product, a double casing is made by sewing together a strong, quick-drying material, such as beef middle, and the fatty outer casing. The double casing is said to cut down breakage on the stuffing bench, and to improve the meat by allowing tighter packing, without taking away from the appearance of the product.



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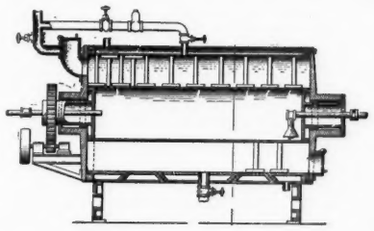
Protective Coating for Citrus Fruits—Ernest M. Brogden, Winter Haven, Fla., to Brogdex Company, Winter Haven, Fla. No. 1,738,864. Dec. 10, 1929—To aid in the preservation and to enhance the appearance of fresh fruit, especially citrus fruit, a coating composed of a starchy material and an oily vehicle in the form of a creamy paste is thoroughly rubbed over the surface. After most of the volatile solvent is evaporated, the fruit is buffed to a high polish. One of the coatings covered by the patent is

composed of 1 volume of gasoline, ½ volume of paraffin wax, and 2 volumes of powdered starch. A harmless coloring agent to mask the whiteness of the starch may also be used with the mixture.

* * *

Cooking and Drying Meat Products—Christopher Offenhauser, Philadelphia, Pa. No. 1,734,824. Nov. 5, 1929—In this cooking and drying apparatus for meat products, which agitates the material being treated and prevents it from sticking to the walls of the cooker, the



material is placed in the outer of two concentric cylinders. Scrapers bearing on both the outer and the inner cylinder remove the material from the walls as the inner cylinder revolves. Steam is run into the outer cylinder during the cooking operation, and into the inner cylinder and jacket around the outer cylinder during drying. The construction of the cooker is shown in the illustration.

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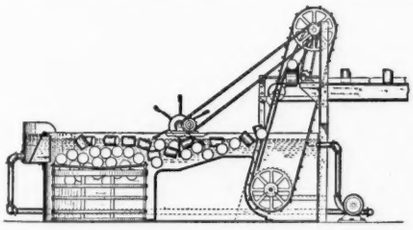
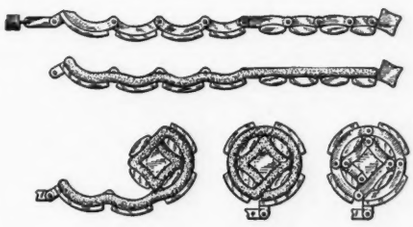
Unloading Can Crates—Frank F. Chapman, Berlin, Wis. No. 1,744,363. Jan. 21, 1930—A device that will automatically unload cans from a retort crate and regulate their flow to the ele-



vator makes use of a liquid in which the cans rise to the top. Soda ash and salt sufficient to give the liquid a specific gravity of 1.32 make it dense enough to float the cans of food. In operation, a crate of sealed cans is lowered into the front portion of the tank and a pump causes the liquid to flow toward the vertical moving carrier. The cans rise to the surface and flow to the paddle wheel, which is so adjusted in relation to the elevator that only the proper number of cans pass under the wheel and onto the elevator.

* * *

Mechanical Pretzel Former—Irwin Elliott, New York, N. Y., to Universal Oven Company, Inc., New York, N. Y. No. 1,739,892. Dec. 17, 1929—In place of hand methods previously used, strips of dough are said to be formed rapidly and uniformly into various shapes by a linked support which is wound about a central shaft. As shown in the illustrations, a strip of dough is placed on the supports while in a horizontal position. The shaft at the right-hand end is then



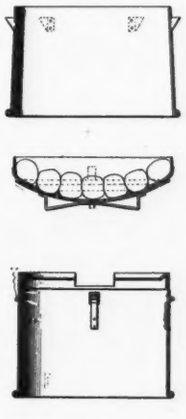
revolved counter-clockwise, bending the strip of dough into that shape for which the particular set of links in use are designed. After the product has been formed, the shaft is turned to a vertical position, allowing the product to fall off the ends of the supports. The shaft is then returned to its horizontal position and the winding action reversed. The spring draws the links back into position to receive another strip of dough.

* * *

Whole-Wheat Breakfast Food—Scott H. Perky, Batavia, N. Y. No. 1,744,500. Jan. 21, 1930—A completely cooked breakfast food containing all parts of the wheat berry, to be served hot after a few minutes' boiling to bring about absorption of water, is made in the following manner: Wheat grains are first thoroughly cleaned, then partly cooked to soften the grains, and tempered to the proper consistency most suitable for the reduction rolls. In the reduction machine, composed of one smooth and one grooved roll, the material is mixed by being forced into the groove. It is removed by a scraper and cooked for several hours with a quantity of water small enough to be completely absorbed. After cooling, the cooked product is dried in the form of sheets or strips of a flinty character. These are then ground to produce granules of a desired size.

* * *

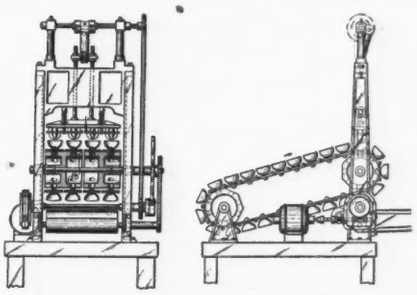
Sugar Solution Used to Improve Wood—George E. Rice, Brooklyn, N. Y., to Conservation Corporation of America. Nos. 1,732,379; 1,732,419; 1,732,420. Oct. 22, 1929—Patent No. 1,732,419 covers a process for treating wood with an aqueous saccharine solution containing about 25 per cent saccharine material by weight, its composition varying with the wood to be treated. Green wood is boiled in the solution, thereby removing sap, gum, etc., reducing shrinkage, and improving the wood. Products removed from the wood are skimmed off the bath and recovered. Patent No. 1,732,379 covers the use of boric acid as a catalytic agent to assist in the osmotic action of the sugar solution on the wood. Patent No. 1,732,420 covers a process in which a non-aqueous sugar solution is used, thus eliminating the necessity for drying after treatment. In one solution, 150 lb. of sugar is used with 1,000 lb. of linseed oil. The saccharine solution containing maltose and cane sirup or molasses products has been found most effective, maltose having greater osmotic action than dextrose.



Improving Colloidal Properties of Egg Products. Albert K. Epstein, Chicago, Ill. No. 1,737,365. Nov. 26, 1929—When certain hydrophyllic colloids, such as gum tragacanth, are added to egg products, the colloidal properties of the product are decidedly modified, and at the same time the chemical changes which would take place if such modification was produced by crystalloids are avoided. Several methods are claimed for dispersing the colloid in the egg material so that a lumpy product is avoided, including wetting the powdered gum with vegetable oil previous to mixing with the egg yolk.

* * *

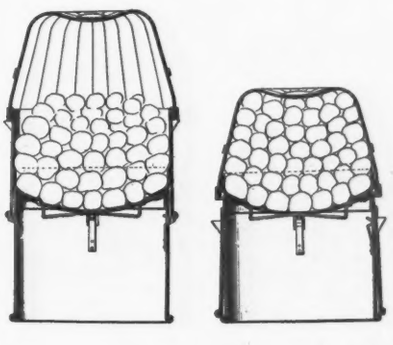
Roll-Making Machine—Charles Gottfried, New York, N. Y., to Gottfried Baking Company, New York, N. Y. No. 1,741,694. Dec. 31, 1929—As the dough-ball cups, on an endless belt, come beneath a number of dies, a Geneva movement halts the belt travel and the cup remains stationary while the die shapes the ball of dough. A stripping plate



prevents any tendency for the dough balls to stick to the die, and they remain in the cups until discharged upon the conveyor shown in the lower right of the illustration.

* * *

Packing Fruit in Baskets—George O. Reshaw, Benton Harbor, Mich., to Perfection Pack Company, St. Joseph, Mich. No. 1,737,518. Nov. 26, 1929—In packing fruit in bushel baskets it is desirable to produce "ring facings" on the top of the basket, or, in other words, to have the top layer of fruit in the basket packed in attractive, concentric rings. The packer, as shown in the left-hand figure, comprises 3 parts, a facing disk with concentric ridges to aid in ring-packing the fruit, a removable support upon which the disk rests, and a movable form normally forming a receptacle with the facing disk. When the form is filled with fruit, it may be forced down over the support, thus raising the fruit into the basket.

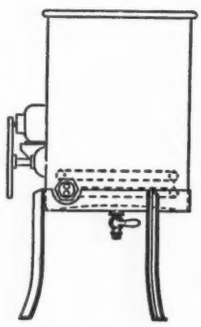


NEW EQUIPMENT

Seen at the Canners' Exhibit

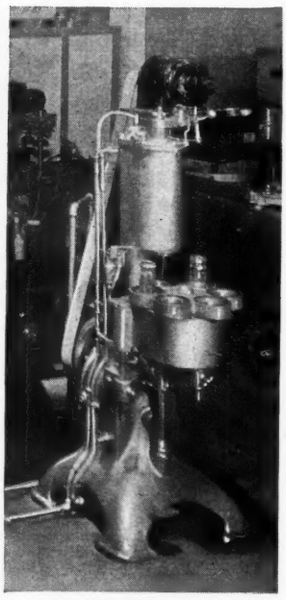
STAFF REPORT

DESPITE the fact that no convention group in the food field ever seemed more diversified—or more strenuous—than the gathering in Chicago Jan. 20 to 25, there is no mistaking the center about which the 10 or more organization meetings were circumscribed; it was the exhibit of canning machinery and supplies. The valuable picture of modern plant equipment that it presented drew more visitors than any other attraction. In attempting to give a brief review of the exhibit, we are able to comment only briefly on a few of the displays that embodied new and improved features never before shown.



GLASS-LINED sirup mixer

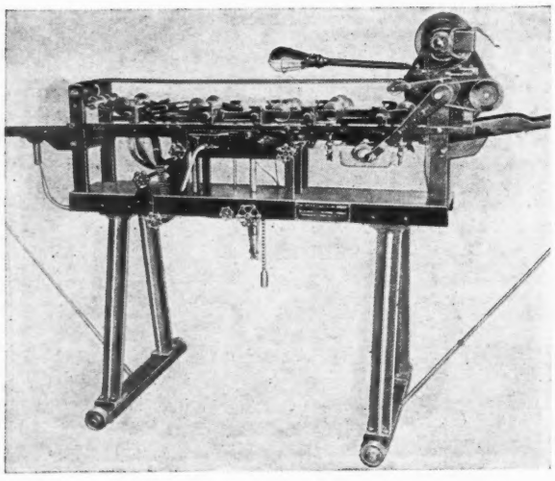
A glass-lined pulp cooker represented the new line of six sizes ranging from 600 to 2,000 gallons in capacity now being manufactured by the Glascote Company, Euclid, Ohio. Cooking equipment in these tanks is the well known Langsenkamp "Kook-more Koil." A glass-lined brine and sirup mixer equipped with a tinned-copper steam coil and motor-driven agitator also was shown. This piece of equipment provides a mixer that cannot harbor thermophilic bacteria, as often is the case in wooden tanks that have not been provided with a non-corrosive, sheet-metal lining.



VACUUM CROWNER is adaptable to many sizes

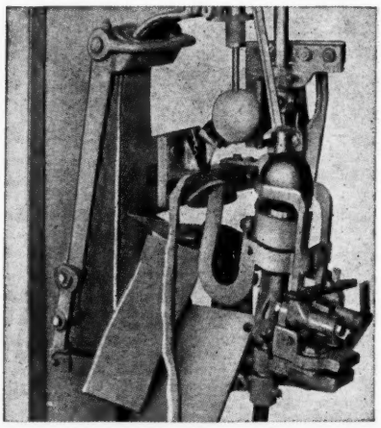
The new Kyler labeler, a companion to the Kyler boxer, was shown by the Westminster Machine Works, Westminster, Md. It is slightly different in appearance and operation from any previous type of labeler, although it employs the principle of rolling the can over the label. The drive is from the head instead of the tail end; paste is circulated through a tube with a slotted side pressing against the pile of labels; the label feed is magnetically controlled; and the machine is automatically stopped if the tail chute fills up. This feature is one of particular interest to those who are attempting to cut costs by cutting the labeling crew to a minimum. The machine also starts automatically when the tail chute is emptied.

NEW KYLER LABELER has automatic stop



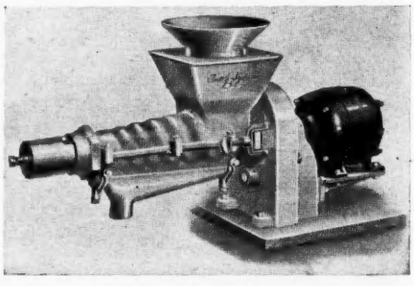
Crown Cork & Seal Company, Baltimore, Md., displayed the Darling crown cap and opener, and the semi-automatic vacuum crowner. The Darling crown cap, similar in construction to the better known Axa crown cap, another product of the Crown Cork & Seal Company, is a resealing cap so designed that it will hold pressure as well as vacuum. This ability to stay on despite pressure from the inside is a feature of importance to those who process in glass at temperatures above the boiling point. With the ordinary cap, it is necessary to use steam plus compressed air in such cases to maintain a pressure differential that will hold the cap in place.

The semi-automatic vacuum crowning machine is adjustable to all sizes of crowns and will handle any shape of container. An important feature lies in



Above—Automatic orange peeler

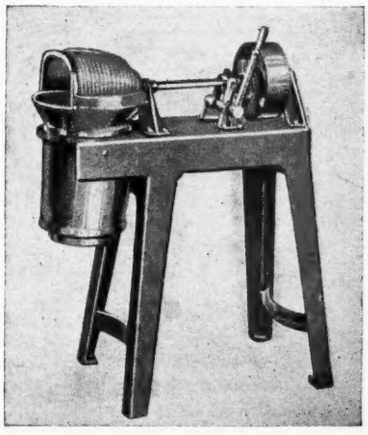
Below—Continuous press for oranges



the fact that it may be operated with or without a vacuum. An automatic stop on the machine operates if a container gets caught or jammed. When operating as a vacuum crowner, this automatic stop is operated also by failure of the vacuum, whether by a broken bottle, pump stoppage, or air leaks.

An aroma of oranges pervaded the atmosphere around the booth of Coons Machinery Corporation, Rochester, N. Y., where B. C. Coons was demonstrating his automatic orange peeler and providing a very palatable juice for the onlookers by pressing it out of the peeled fruit in his new automatic continuous press. The orange peeler is a modification of the well-known apple peeler. The press squeezes but does not grind the "rag" of the orange, and gives a fairly dry pomace. It is interesting to note that Mr. Coons believes that milk dealers will find fresh orange juice a profitable item to deliver along with the morning milk.

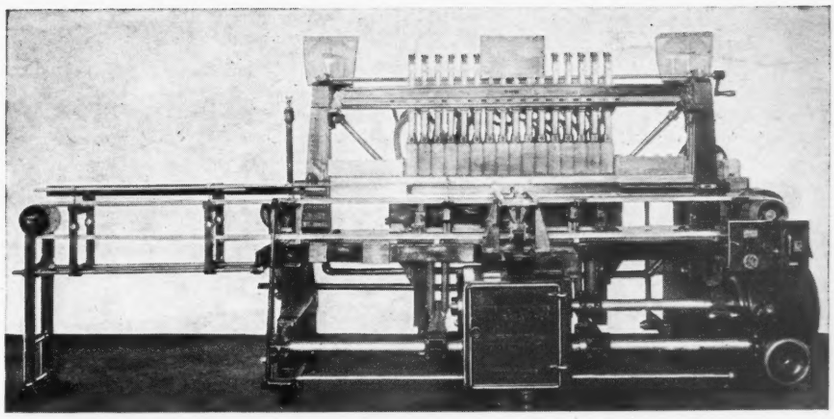
A new type of cutter for relish or



RELISH CUTTER for uniform cut

similar products was offered by the American Utensil Company, Chicago, Ill. The cutter has a vertical shaft on which are located a series of revolving knives. Between the knives there are stationary grate-screens, graduated in successive mesh sizes from the top downward through smaller sizes. The product to be cut up is poured into a hopper at the top, and passes through the several grates as rapidly as it is cut to size that will permit passage. This arrangement avoids the necessity of timing or sifting runs, and also eliminates the mushy mass that results when the product is cut too fine.

Hansen Canning Machinery Corporation, Cedarburg, Wis., showed a whole-grain corn cutter of a new type, after testing it by a season in production service. It is of the revolving knife type with a cob-centering device. The depth of cut is adjustable while the machine is in operation. The cutting head can be swung up out of the machine so that knives may be examined or changes made.

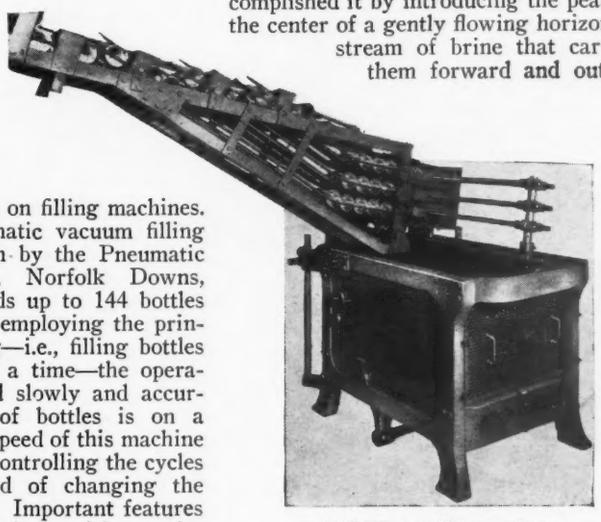


MULTIPLE VACUUM FILLING MACHINE has speeds up to 144 per minute

In line with the trend toward packing whole grain corn, Sprague-Sells Corporation, Chicago, Ill., has prepared three pieces of new equipment, including a combination washer-cleaner in which washing on a shaker screen is followed by water flotation, the desirable kernels sinking to the bottom and being removed by a screw conveyor. The other new apparatus comprises a shaker - drier and a whole - grain corn hopper for use on filling machines.

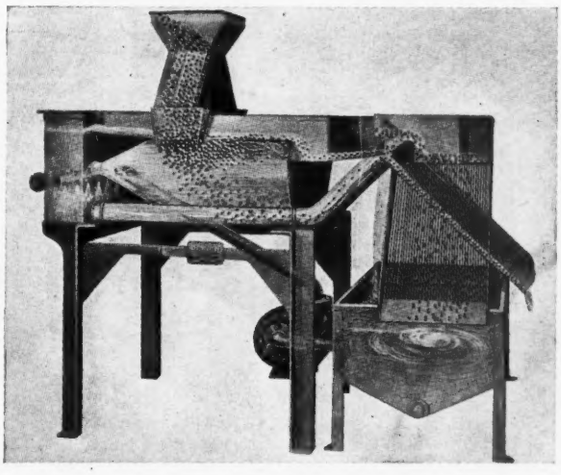
A multiple automatic vacuum filling machine was shown by the Pneumatic Scale Corporation, Norfolk Downs, Mass. It has speeds up to 144 bottles per minute, and by employing the principle of gang filling—i.e., filling bottles in groups of 16 at a time—the operations are performed slowly and accurately. Movement of bottles is on a straight line. The speed of this machine can be adjusted by controlling the cycles of operation instead of changing the speed of the motor. Important features of this machine are the no-drip nozzles and the ability to fill bottles without foaming.

An automatic quality grader or separator for peas brought out by Berlin-Chapman Company, Berlin, Wis., operates on the specific-gravity principle. In a brine of suitable density hard peas sink and tender peas float. In most brine separators previously developed, the problem has always been to obtain an adequate separation of the buoyant and sinking peas. Berlin-Chapman has accomplished it by introducing the peas in the center of a gently flowing horizontal stream of brine that carries them forward and out of the chamber in two routes, as shown in the illustration, and then over a screen to remove them from the brine.



CASER handles empty or filled cans

PEA-GRADER utilizes specific gravity differences



A caser for either empty or filled cans was shown by Standard Sealing Equipment Corporation, Long Island, City, N. Y. In the illustration it is putting empty cans into cases. Two lines of cans are handled simultaneously.

Thermostatic heat control on the glue pot of the labeler made by the Burt Machinery Company, Baltimore, Md., is a new improvement on that machine. This feature is a decided improvement over the older three-point temperature control, particularly because it avoids heating the pickup glue to a temperature too high for good operation.

William E. Urshel, Valparaiso, Ind., showed a new cutter featured by an inclined revolving hopper for string or stringless beans.

◂◂ Manufacturers' News And Equipment

Magnetic Separator Has Automatic Trap

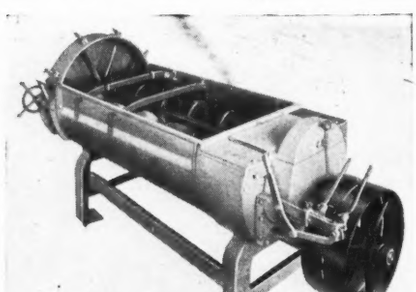
A NEW magnetic separator with a completely automatic trap has been put on the market by the Magnetic Manufacturing Company, Milwaukee, Wis.

The new separator, type "FT," will remove ordinary tramp iron, nails, bits

of wire, nuts, broken bits of metal, and the like from grain and similar materials. As the product passes down the chute, the iron is retained by the electro magnet shown in the illustration. The iron is released by cutting off the current, and this immediately opens a trap, as shown in the left-hand view. In case of failure of the electric current, this feature prevents the iron from again entering the stream of material. As soon as the current is turned on the trap closes automatically and the magnet goes back into operation.

New Mixer Combines Two Speeds

AN INGENIOUS combination of slow-moving mixing arms and high-speed beater blades is responsible for the thorough and rapid action of the "Twin-screw Super Mixer," according to its maker, the Hottman



Machine Company, 3325 Allen Street, Philadelphia.

The charge enters the mixer at the left end of the figure shown below, where it comes in contact with the beater blades. After being subjected to bearing and breaking action of the blades, the material goes to one of the two helical mixing arms, which kneads and rubs the contents against the bottom of the twin channels. At the right-hand end of the mixer, it passes around the center partition and the second mixing arm carries it back into the beater-blade section. Upon the opening of a discharge gate, the machine will empty itself. It may be obtained with a steam jacket if desired, and in several capacities.

Gage for Milk Tanks

THE NEW Milk-Tank Liquidometer, a product of the Liquidometer Corporation, 37th Street and Skillman Avenue, Long Island City, N. Y., has been designed especially for use with glass-lined tanks for milk, ice cream and similar products. In the picture above, a 3,000-gallon horizontal storage tank in the Long Island City plant of the Borden Farm Products Company is shown equipped with a 12-inch model reading in cans. A 6-inch model for tanks up to 1,500 gallons and a 22-inch type for over 4,000 gallons are also available. Remote reading types will soon be on the market according to the manufacturers.

The one-piece float and the arm within the tank are said to be easy to remove and clean. All nickel or Allegheny metal parts are used when contact with milk occurs. The brushed aluminum case is waterproof and the dial rim is chromium plated.

The gage makes it easy to keep a complete daily inventory of milk brought in and milk bottled or used. Its accuracy is not affected by the temperature or weight of the liquid with which it is used, according to the makers.

◂◂ Manufacturers' Publications

Packaging—A handy catalog of material for use in sealing and labeling both cardboard and wooden shipping containers is published by the Diagraph Stencil Machine Corporation, St. Louis, Mo. Tables and other information valuable in the shipping room are also contained in the catalog.

Glassine—An attractive leaflet which tells of the latest developments in packaging and printing with glassine papers has been issued by the Westfield River Paper Company, Inc., Russell, Mass. Inserted in the leaflet are samples of printed and plain types of glassine, as well as a discussion of the uses of this type of packaging material.

Materials Handling—A leaflet entitled "Jacklift and Stacker Practice, Engineering Edition No. 57," put out by the Lewis-Sheppard Company, 174 Walnut Street, Watertown Station, Boston, Mass., contains numerous illustrations of various types of materials' handling equipment. Many of the photographs show the equipment in operating installations.

Pumps—A new bulletin entitled "Gould's Centrifugal Pump Selection Charts" gives a number of valuable charts by which the customer can determine the size pump to use for any given capacity and head, and also the size motor required to drive it. After the correct pump for use is determined in this manner, the specifications, details of design, and dimensions of pumps of this size can be referred to. The publication has been put out by Gould's Pumps, Inc., Seneca Falls, N. Y.

Trucks—Several leaflets describing the "Step-N-Drive" trucks for house to house delivery service, especially milk delivery, have recently been put out by the Step-N-Drive Truck Corporation, 1255 Niagara Street, Buffalo, N. Y. One describes the standard size, 6-cylinder truck, powered by a Lycoming motor, and others describe "Junior Step-N-Drives" on Chevrolet and Ford chassis.

Packaging Machinery—An attractive and interesting booklet, which illustrates many of the types of packages with which apparatus of the Pneumatic Scale Corporation, Ltd., Mass., is used, has recently been published. Statements by executives in many of the companies using packaging machinery of this company also are contained in the booklet.

Metals and Alloys—In a booklet issued by the International Nickel Company, 67 Wall Street, New York City, entitled "Modern Ideas in Food Plant Sanitation," the many applications of Monel metal and pure nickel for equipment in such plants are described. It is well illustrated with photographs of the apparatus and installations.

Hoists—A booklet showing more than 25 instllations, where Shepard electric hoists have successfully replaced older methods, is being distributed by the Shepard-Niles Crane & Hoist Corporation, Montour Falls, N. Y. Statements by men in whose plants the hoists have proved satisfactory also are contained in the booklet.

News of the Month

Guth Removed From Office In Loft, Inc., Wrangle

THE removal of Charles G. Guth from his positions as a director and vice-president of Loft, Inc., as announced by Alfred R. Miller, president of the concern, on Feb. 19, brought to a climax the latest wrangle in the management of this $10,000,000 candy company. The direct cause of the removal was charges of fraud against Mr. Guth in connection with the sale of Mavis Candies, Inc., of which he was president, to Loft, Inc., last summer. As part of the merger agreement, Mr. Guth had guaranteed to increase the sales of Loft, Inc., $2,000,000 during 1930 or forfeit $100,000.

Early in January Mr. Guth, in letters to stockholders, charged Mr. Miller and his associates with mismanagement and went to the courts for a mandamus order requiring the company to permit him to examine the books. The order was denied. Among the retaliatory steps that followed in quick succession were the receivership suit brought by Loft, Inc., against Mr. Guth and his concern and the appointment of temporary receivers; a restraining order issued, but later rescinded, against Loft, Inc., at the instigation of Mr. Guth, preventing them from disposing of any stock in the company; and a number of charges and counter-charges of mismanagement. Several suits growing out of the case are still in the courts.

The disagreement is said to be an aftermath of the trouble occurring last spring that resulted in the ousting of George W. Loft and George Leon Loft and the election of Mr. Miller to the presidency of the organization.

"Babe Ruth" Struck Out As Candy Trademark

ALTHOUGH the name of Babe Ruth has been emblazoned on the pages of countless newspapers and magazines, it will never be seen on a candy wrapper, the Patent Office has ruled. The George H. Ruth Candy Company, of which the celebrated baseball star was made vice-president, in addition to being guaranteed a royalty on sales, hoped to register the trademark "Ruth's Home Run" and "George H. 'Babe' Ruth" for use on candy bars.

The Curtiss Candy Company, which successfully opposed the registry, makes a candy bar known and registered as "Baby Ruth." The designation was adopted in 1919, and, according to the maker, by reason of the popularity of the name of a daughter of President Cleveland 35 or 40 years ago. The benefit the Curtiss Company has gained by reason of its similarity to "Babe Ruth" does not alter the fact that it has a perfectly legitimate trademark, it was ruled. To permit the registry of "Babe Ruth" or "Ruth's Home Run," however, would certainly cause confusion, due to the similarity of these names to the one already registered, the commissioner pointed out.

A great amount of money has been spent by the Curtiss Candy Company to popularize its product, it was claimed, and the sales now reach as high as $1,000,000 a month. Any candy bar marked "Babe Ruth" undoubtedly would share in the good will which the name "Baby Ruth" has created, said the decision, and its distribution therefore would be unfair. The distribution of horsehide-covered spheres by Mr. Ruth, although not mentioned in the decision, still appears to be fair enough.

Campbell's Soup Will Have Newspaper Ads

THE Campbell Soup Company, for many years one of the greatest magazine advertisers, is adding newspaper advertising to its mediums of sales promotion. For 17 weeks, 750-line advertisements are being run in a large number of cities of over 100,000 population. Later the campaign will be extended until thorough national major market coverage has been secured.

Two significant features of the new advertising drive of the company are the appeal based on the 21 varieties of soup and the suggestion that 6 cans be purchased at a time. In the past it has been found that most housewives have restricted their purchases to 3 or 4 kinds.

COMING EVENTS

MARCH

6—Institute of American Meat Packers (New York region), New York City.
17-20—American Society of Bakery Engineers, Chicago, Ill.

APRIL

7-11—American Chemical Society, Atlanta, Ga.
—American Dry Milk Institute, Chicago, Ill.

MAY

5-9—American Association of Cereal Chemists, Chicago, Ill.
14—American Spice Trade Association, New York City.

Fleischmann, Corn Products In Prohibition Case

ALONG with 17 alleged bootleggers, the Fleischmann Company and the Corn Products Refining Company were named in an indictment returned Feb. 10 in the federal court at Springfield, Ill., charged with conspiracy to violate the national prohibition act. It is alleged that they furnished large shipments of yeast and corn sugar to Illinois distilleries with full knowledge of the fact that they were being used in the manufacture of illegal beverages.

The Department of Justice is reported to be using this as a test case to determine just how far into the realm of raw materials the Volstead Act extends.

Coincident with this charge, a blanket indictment was returned in New York accusing 186 business concerns and individuals with conspiracy to violate the prohibition law by the diversion of more than 1,000,000 gallons of alcohol a year. Several bottlers, an essential oil company, and a spice company were included in the list.

Small Cans Increase In Popularity

PRACTICALLY ignored until recently, the demand for canned food products put up in small quantities has doubled in volume in each of the past two years since the Number 1 can, holding 8 ounces, has been in general use. This demand comes from the large number of 2-member families and from families in which consumption of such products is confined to the parents of young children. Because of the small capacity of ice boxes and the prejudice of the housewife against leftovers, the Number 1 can has been received with great favor, and the experience of the canners demonstrates that the public is willing to pay a premium for the privilege of buying in such hand-to-mouth quantities. As a result, it is expected that a constantly increasing variety of processed foodstuffs will make their appearance so packaged. This trend has been noted with interest by the Foodstuffs Division of the Department of Commerce. Although there is no accurate index of the growing demand, the opinion is expressed that the canners will profit by recognizing the fact that they can make sales of food packed in the 8-ounce can when the same product packed in larger cans, remains on the shelf.

Standards for Preserves and Jellies Desired by Manufacturers

ENACTMENT of legislation to establish statutory standards and definitions for preserves, jams, jellies, and fruit butters was requested by manufacturers at a hearing before the House Committee on Agriculture at Washington on Feb. 20-21. Daniel R. Forbes, counsel for the National Preservers' Association, which represents approximately 80 per cent of total production, informed the committee that the manufacturers desire effective government regulation in order to prevent putting themselves out of business by degrading the quality of their products to meet competition based upon price rather than intrinsic worth.

Such legislation would take the form of an amendment to the Food and Drugs Act establishing definite ratios of fruit to sugar and giving the Department of Agriculture control over the labeling of preserves, jams, and jellies. There are now no legal definitions or standards, and the department's rulings setting up such standards are not enforceable, as the department has first to prove what a pure fruit preserve is before a deficient product can be found to be in violation of the law. Recent court interpretation of the Food and Drugs Act also permits the sale of imitation preserves under such fanciful names and labels as "strawberry spread." Under the terms of the Reed bill, which was indorsed by Mr. Forbes and other spokesmen for the manufacturers, such products would have to be labeled "imitation preserve" or something similar.

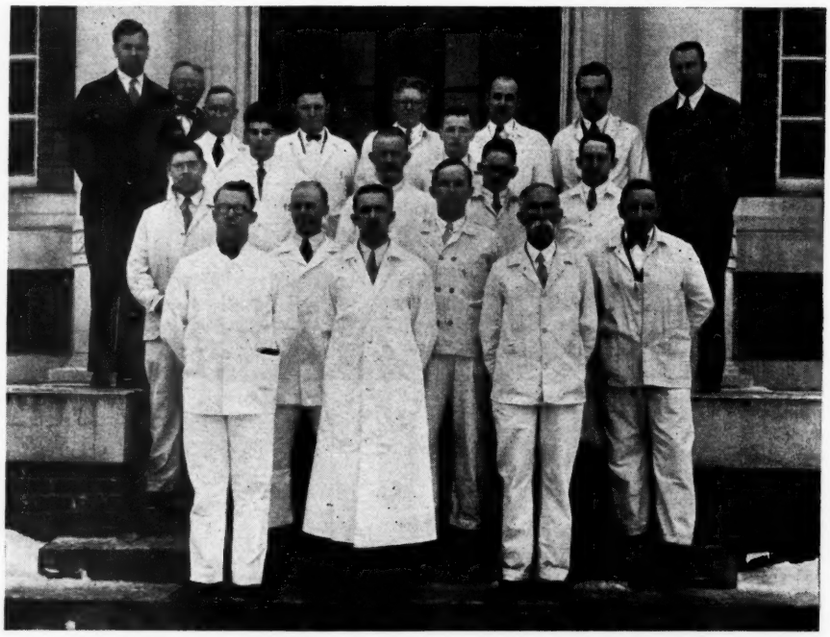
A bill sponsored by Representative Haugen, identical in other respects with the Reed bill, would permit the use of corn sugar in jams, jellies, and preserves without declaration on the label. This met with objection from W. G. Campbell, chief of the Food & Drugs Administration, who urged an amendment providing that the sugars used must be named on the label. For this purpose designation as cane sugar, beet sugar or corn sugar, as the case might be, would be acceptable, but simply "sucrose" or "dextrose" would be sufficient. Mr. Forbes stated, in response to inquiry from the committee, that he had nothing to say for or against corn sugar.

Mr. Campbell also suggested an amendment to the definition of preserve and jam in the Reed and Haugen bills to provide that it shall mean not only "the clean, sound product possessing definite characteristic flavor of the fruit named on the label" but shall be composed exclusively of the fruit named on the label. The amendments proposed by Mr. Campbell were acceptable to the preserve manufacturers who testified at the hearing and met some objections to the proposed legislation that were raised at an earlier hearing.

In the case of fruits deficient in pectin, the Reed and Haugen bills permit the addition of pectin, provided that in the case of preserves and jam the ratio of not less than 45 pounds of fruit to each 55 pounds of sugar shall be maintained, and that the finished product containing such added pectin shall have not less than 68 per cent water-soluble solids derived from the fruit and sugar used in its manufacture. Jelly containing added pectin shall not contain less than 65 per cent of water-soluble solids derived from the fruit and sugar used in its manufacture and its composition shall correspond to not less than 50 pounds of strained pure fruit juice to each 50 pounds of sugar.

J. L. Schneir, of Griggs, Cooper & Company, Minneapolis, Minn., and president of the National Preservers' Association, indorsed the bill, stating that honest manufacturers who maintain a high standard of quality for their products are hurt by the passing off of imitation preserves as genuine, because the buying public, when deceived by the inferior products, loses confidence in all factory products and stops buying them. He also pointed out that the marketing of large quantities of imitation preserves is prejudicial to the fruit growers, as the imitation products contain 60 per cent less fruit than is used in the manufacture of the genuine preserve with which it competes. He assured the committee that the bill has the hearty support of fruit growers throughout the country.

Dairymen Complete Management Course



SEVENTEEN men, mostly milk plant managers and workers, took the 10-day course in milk testing and milk plant management given at Massachusetts Agricultural College a few week ago. The bacteriology, testing, and processing of milk were studied in the course, which was under the direction of H. G. Lindquist, shown standing at the left end of the top row. Those in the photograph are:

Bottom Row (left to right)—Lester A. Badger, Gay Farm, Norwood, Mass.; Edward A. Madden, Deary Brothers Dairy, Webster, Mass.; Francis Piasta, milk dealer, Webster, Mass.; Mark L. Shaw, Jr., Lowell, Mass.; C. D. Towne, Saratoga Creamery Association, Schuylerville, N. Y.; Gerard R. Lariviere, Southbridge, Mass.

Second Row (left to right)—Frederick H. Bowser, Jr., Bowser Dairy, Woburn, Mass.; Manuel F. Rose, Frank Marks Dairy Farm, South Dartmouth, Mass.; Arne Reponen, United Co-operative Society, Gardner, Mass.; Arthur R. Turner, Marlboro Dairy, Marlboro, Mass.; Albert M. Frye, Leominster, Mass.; Percy Amatt, Brookside Dairy, Northampton, Mass.

Top Row (left to right)—H. G. Lindquist, instructor, Massachusetts Agricultural College, Amherst, Mass.; Prof. J. H. Frandsen, head of the department of dairy industry, Massachusetts Agricultural College; Thomas Deary, Deary Brothers Dairy, Webster, Mass.; Joseph Beaubien, Beaubien Brothers Dairy, Montague, Mass.; David Somerville, Woburn, Mass.; Frank H. Reed, Jr., Wayside Farm Creamery, Greenfield, Mass.; Clarence Tibbetts, Lyndonville Creamery, Watertown, Mass.; Asst. Prof. M. J. Mack, Massachusetts Agricultural College, Amherst, Mass.

Tariff Bill Makes Progress in Senate; House Acts on Margarin Law

By Paul Wooton
Washington Correspondent

CONSIDERABLE progress on foodstuffs in the tariff bill has been made recently, but the final fight on sugar is yet to come. Whether the rate will remain at the present level of 1.76 cents per pound against Cuba, or be raised to 2.40 cents, hinges on the action of the conference committee after the bill has left the Senate. The probable personnel of the committee appears to give the two possibilities an even chance. Since the Smoot amendment was voted down so decisively, a raise on the Senate floor hardly is to be expected. The bounty seems to be out of the picture. Some elements still are striving to limit non-dutiable Philippine shipments to 600,000 tons, but this too seems unlikely.

Recently revived rumors that President Hoover is likely to veto the completed bill cast some doubt on the outcome of the tariff measure. Still, after a year of hard labor, Congress is in no mood to let the bill slip now.

The Senate took up direct amendments from the floor on Feb. 5. The commodity schedules are being considered rapidly in their numerical order. As we go to press, Schedule 7, agricultural products and provisions, has been completed. Thus most of the foodstuff rates are in their final form. A few more changes may be expected by later Senate action after the tariff making has passed through its present phase, and still later when the bill goes into the conference committee between the House and Senate. The bill is expected to leave the Senate early in March.

When the floor amendments began with the chemical schedule, the coalition element pushed through a number of sharp reductions. This low-tariff reaction aided the foodstuffs industry in blocking the attempt of farm interests to assess all starches at 2½ cents per pound. This proposal would have put all food and textile starches, including tapioca, sago, cassava, and rice starch, at the potato starch rate, on the grounds that these import commodities compete with American agricultural products. Otherwise the industry was not greatly concerned in Schedule 1. In the metals group, aluminum utensils were reduced from 11 cents per pound plus 55 per cent to a flat 25 per cent *ad valorem.*

The Senate then quickly pushed through to the agricultural schedule, omitting the tobacco and, what is more important, the sugar schedule entirely. A number of rate increases were made throughout the list. In each case the Senators sponsoring these raises cited evidence to show that the products in question are meeting tangible import competition. The changes are shown in detail in the accompanying table.

Aside from sugar, no other important changes are foreseen. The defeat of the starch increase may be taken as an indication of what is likely to happen to the similar demand of the farm group for high rates on the tropical oils and fats. Evidence has been submitted by the Farm Bureau to show the interchangeability of all conceivable import oils with American agricultural products, but the prevailing Senate reaction toward moderate rates appears to preclude acceptance of this argument.

Congress Acts on Margarin Law

To extend the oleomargarin law sufficiently to permit it to include certain new butter substitutes and cooking fats that are outside the letter of the present definition, the House of Representatives passed a bill (H. R. 6) on Feb. 6 which has good prospects of becoming law during this session of Congress. The bill, sponsored by Representative Haugen on behalf of the dairy interests, is aimed principally at so-called artificially colored cooking compounds, which are in some cases so similar to butter as to deceive government experts. According to a rough estimate, 50,000,000 pounds of these products were sold in America last year. There is reason to believe that in some instances certain substitutes were sold as butter, if not on the market, at least in restaurants.

These compounds differ from oleomargarin in that the ingredients, which run about 85 per cent coconut oil and the rest peanut oil, are emulsified with water; coloring matter and butter flavoring then being added.

The new language added to Paragraph 2 of the act brings within the definition of items made in semblance of butter such products as are "churned, emulsified, or mixed in cream, milk, water, or other liquid, and containing moisture in excess of 1 per centum, or common salt. This section shall not apply to puff-pastry shortening . . . . nor to . . . . salad dressings, mayonnaise dressings, or mayonnaise products." This proviso would take effect 6 months after enactment. As with the items now included in the law, the tax will be ¼ cent per pound for uncolored material and 10 cents per pound for that which contains artificial yellow coloration.

Opposition to the bill was heard on Friday, Feb. 14, when several witnesses appeared on behalf of the principal manufacturers of artificially colored cooking compounds. G. W. Murdock, of Chicago, spoke in behalf of 12 firms.

After an executive session of the Senate Committee on Agriculture and Forestry on Feb. 20, the oleomargarin bill was reported favorably without amendments and was introduced by Senator Norbeck. Since the main obstacle to the hill was in the House, its passage of the Senate seems assured after 3 or 4 weeks.

Table Showing Tariff Amendments on Senate Floor

Duties are in cents per pound unless otherwise stated.
(The paragraph numbers are as of the Senate Finance Committee Bill.)

Paragraph	Item	Rates		
		Existing	Finance Committee	Proposed
42	Gelatin and glue, n.s.p.f.; value less than 40	20% plus 1½	25% plus 2	20% plus 1½
	Value 40 or more	20% plus 7	20% plus 7	20% plus 7
82	Sodium bicarbonate or baking soda	½	½	Free
	Sodium borate or borax, refined	½	½	Free
339	Aluminum utensils	11 plus 55%	11 plus 55%	25%
701	Cattle, weighing:			
	Less than 1,050 pounds each	1½	..	..
	1,050 pounds or more	2	..	..
	Less than 800 pounds	..	2	..
	800 pounds or more	..	2½	..
	Less than 700 pounds	..	..	2½
	700 pounds or more	..	..	3
710	Cheese and substitutes therefor	5 but not less than 25%	8 but not less than 35%	8 but not less than 42%
713	Eggs, dried or sprayed:			
	Whole eggs	18	18	36
	Egg albumen	18	18	60
	Egg yolk	18	18	30
	Eggs, frozen and prepared, n.s.p.f.	6	8	11
717	Halibut, frozen	2	2	5
721	Canned oysters or oyster juice	Free	Free	8
741	Dates: in bulk	1	2	2
	Pitted or preserved	35%	5	5
	Packed in quantities of 10 pounds or less	..	..	7½
730	Vegetable oil cake and oil meal cake n.s.p.f.	Misc.	Misc.	0.3
745½	Mangoes	Free	Free	15
746	Pineapples, per crate of 2.45 cu.ft.	22½	35	50
748½	Avocados or alligator pears	Free	Free	15
763	Beans, dried	1½	2½	3
766	Mushrooms, preserved	45%	10 plus 60%	10 plus 45%
767	Peas, green or unripe	1	2	3
772	Fresh celery, lettuce, and cabbage	25%	50%	2
772	Horseradish, crude	50%	50%	3
773	Sauerkraut	35%	35%	50%
774	Chickory, crude	1½	1½	2
779	Spices and spice seeds: Unground anise, caraway, cardamon, cassia, clove, cinnamon, coriander, cummin, ginger, fennel, mace, mustard, pepper, and pimento, etc., now dutiable at various rates all put on the free list.			
802	Spirits, cordials, bitters, etc., unfit for beverage use	$5 per proof gal.	$5 per proof gal.	$2.60 per proof gal.

Meat Packers Discuss Frozen Foods

SOME of the mysterious haze that has surrounded the process of quick freezing was dispelled at the regional meeting of the Institute of American Meat Packers in Chicago on Feb. 20. The critical interest of the 300 who were there, as well as the addresses and discussion themselves, showed that the whole question is emerging from its position as a possible panacea for the ills of the meat-packing industry, and is now being regarded as a practical and valuable advance, but one that has nullified no chemical, thermal, or economic laws.

For a good part of this alteration of viewpoint, the address of Harden F. Taylor, of the Atlantic Coast Fisheries Company, undoubtedly was responsible. To those who felt that quick freezing and magic were very near akin, his statement that slow freezing may ultimately prove better than quick freezing, after all, came as a distinct shock. The dripping or sliminess that takes place when ordinary slow-frozen fish or meat is thawed is not due to the rupture of the cell walls by ice crystals, according to Dr. Taylor, but to internal chemical changes that do not necessarily depend upon the rate of freezing. A processing treatment given to the fish prior to the freezing operation will nearly eliminate dripping, he contended. Details of the processing treatment were not disclosed.

Carl E. Kolbe, who spoke previous to Mr. Taylor, also dispelled any idea that quick freezing was something new or untried. More than 15,000,000 pounds of quick-frozen products were marketed last year, he said. He contrasted the individual-package method of freezing fish with the solid-block method, balancing the more attractive appearance of the former against slower defrosting rates of the latter.

An experimental quick freezer operated by solid carbon dioxide was demonstrated at the meeting by C. L. Jones, of the Dry Ice Corporation of America. Mr. Jones froze chops during the time he was speaking. He pointed out, however, that this product is particularly suitable for the transportation of frozen foods, about 300 truck bodies in present use being so equipped.

Problems of display cases for frozen products were treated by F. B. Green, of Ottenheimer Brothers, Baltimore, and by A. T. Millott, of the General Electric Company. Mr. Green rated the cost of such cases at from $750 to $1,500. He estimated cost of refrigeration at 25 cents a day and depreciation at 35 cents, an operating cost total of 60 cents a day. Mr. Millott told of research work now being done on this type of case.

In regard to transportation of frozen products, R. W. Keyes, of the Booth Fisheries Company, Chicago, Ill., stated that the ordinary salt and ice car had proved satisfactory for his company's purposes, although this feeling is not unanimous.

An exhibit of cabinets containing frozen meat, and a dinner featuring quick-frozen steak were on the program.

Milk Goes to Schools in Paper

Borden Adopts Paper Bottle

W. T. Irwin, of the Borden Company, holds one of the new Sealcone containers in which the company has begun to dispense milk in New York City. The only other large New York City distributor, Sheffield Farms, adopted the single service container last year. At the present time, the "paper" milk bottles are being used experimentally in retail store trade and in distribution to schools. It is asserted that 40,000,000 of these containers will be used in 1930. The bottle with the handle is a type used 30 years ago.

Natural CO_2 Wells May Aid Freight Refrigeration

A NATURAL SOURCE of carbon dioxide from which the solid material can be made for use in freight refrigeration in the West is promised from gas wells in Utah and Colorado. The use of natural carbon dioxide has never been attempted previously. Although the supply has been known for some time, no market was apparent until the field for solid carbon dioxide in the shipment of foodstuffs assumed its present proportions.

The two gas domes under consideration are said to be controlled by a single group of Western business men holding options on the existing permits. George D. Parkinson, of Salt Lake City, Utah, has been acting as attorney in royalty negotiations with the Interior Department. A recommendation is pending before the Conservation Branch of the U. S. Geological Survey.

One of the domes is something unique to oil drilling experience. It is known as the Farnham structure, near Price, Utah. An oil company drilled into it some years ago and found, to the surprise of the promoters, a gas that would not burn. The hole was plugged and the working abandoned. The gas is almost pure CO_2 with helium in noncommercial quantities. In its natural state it is said to meet requirements for purity necessary for refrigeration of foods.

At the other prospect, the Garamesa structure in western Colorado, the gas is combustible and would require refining. Byproducts would supply a power source for the compressor plant and possibly illuminating gas for the nearby cities of Grand Junction and Grand Valley. The CO_2 content is about 20 per cent.

In the well, the gas occurs at a pressure of about 500 pounds per square inch. This must be increased to 1,100 pounds to convert the dioxide into a liquid preliminary to spraying it to form CO_2 snow.

According to the present plan, the prospect that seems most promising will be developed first and the other will follow with growing demand. Another tentative source of carbon dioxide is the "Ice Cream" well near Walden, Colorado, another queer formation. Here, as a result of the cooling effect due to expansion of the gas, the oil comes up in the form of snow which is melted in tanks, the carbon dioxide content being wasted at present.

Use of Margarin in Europe Cuts Butter Demand

THE increasing consumption of butter substitutes in European countries is having an increasing effect both upon the demand for butter in importing countries and upon the surplus in butter exporting countries, according to the Bureau of Agricultural Economics, U. S. Department of Agriculture.

Margarin consumption in Germany now exceeds butter consumption, says the Bureau. In Denmark and Netherlands, the exportable surplus of butter is augmented by the use of margarin in home consumption. The increased use of butter substitutes in European countries is attributed in part to "material improvement in the quality of European margarin."

"Foreign production of butter in recent years has followed much the same upward trend as that of the United States. Relatively low American butter prices during much of the past year have discouraged imports into the United States and produced a slight export balance. New Zealand butter shipments to Canada continue to increase, but of the Canadian cream and milk thus displaced some 20 per cent less than in the previous year was sold in the United States in 1929."

Other factors in the current international dairy situation, as enumerated by the Bureau of Agricultural Economics, are that United States imports of Swiss cheese are increasing, while the American output of Swiss cheese shows a corresponding decline; butter production in Switzerland is being encouraged to relieve over-production of cheese, and in Italy, which is the source of nearly half of the United States cheese imports, cheese production has increased steadily in recent years.

Wheat Prices Lowest In 15 Years

A GOOD MANY hopes for farm relief hit the bottom of the wheat pit with a dull thud during the last two weeks, as commodity prices went to new lows. May wheat, which last June sold for $1.64 a bushel, was below $1.08. A decline of more than 56 cents a bushel on the 850,000,000 bushels of the last wheat crop means a shrinkage greater than $475,000,000. This has occurred in spite of the efforts of the organizations created under the $500,000,000 revolving fund law to bring relief. The price for May wheat on Feb. 24 was 10 cents a bushel under the price that farmers' co-operatives are offering for cash wheat. The corporation recently organized with $10,000,000 capital to buy wheat for stabilizing purposes seems to have met with anything but success.

A paper loss to the government of $1,800,000 on wheat alone is indicated, and storage charges on the 18,000,000 bushels of wheat being carried amount to about $180,000 a month.

Food Products Rank High In Radio Advertising

THE ether waves absorbed a total of $2,589,160 for the advertising of food products during 1929, a summary of radio broadcast figures in *Trends and Indications* reveals. Only in the group that includes radio sets and phonographs was the expenditure greater.

Totals for food products show that $563,984 was spent in the "confectionery and soft drinks" classification, more than $100,000 below the 1928 expenditures for these products. In the "food and food beverage" classification, however, a rise from $773,476 in 1928 to $2,025,176 in 1929 puts this group in the forefront, ahead of "drugs and toilet goods" and of the automobile industry, the totals for which were $1,940,562 and $1,720,803, respectively. The total amount spent on radio broadcast advertising during 1929 was $18,729,571, according to the summary.

Trend to Lighter Meats Due to Machine Labor

THE TREND in meat-consumption figures from beef to the lighter types of meat, such as pork and poultry, is traced to the mechanization of industrial and commercial life by E. L. Thomas, chief of the Meats, Fats, Oils and Livestock Section, U. S. Department of Commerce, in a recent article in the *United States Daily*.

The average person in the United States eats approximately 13½ pounds more pork per year today than he did 10 years ago, and approximately 11½ pounds less beef. Turkey and chicken are now coming to be eaten all the year round, and have undoubtedly displaced some of the heavier meats. The growth of the fish industry, according to Mr. Thomas, also reflects the wider use of lighter foods, and is directly related to the consumption of meat.

In addition to the lessened need for heavier food brought about by shorter working hours and a reduction in manual labor, economic factors also have contributed to the preference for lighter meats, he pointed out. Chief of these is the price advantage of pork, and the more uniform quality obtainable, due to the ease of distribution, especially of ham and bacon, as well as the standardization of brands effected through advertising. The keeping quality of pork products, he said, also has served to stimulate consumption.

Frozen-Food Cabinets Tried In Retail Stores

FIFTY "freezer-refrigerators" of the type shown in the illustration are now being used in a group of stores in the Middle West as a part of an investigation being conducted by the Atlantic Coast Fisheries Company. The costs of distributing quick-frozen products in various sections of the country, as well as determination of the most satisfactory type of freezer with which to supply the trade, are included within the scope of the experiment.

The freezer shown maintains temperatures considerably below the freezing point. Wire partitions divide the interior into three parts and serve to keep the piles of fresh fillets in order. As mentioned on page 51 in FOOD INDUSTRIES for February, freezers in retail stores are an absolute necessity in the distribution of frozen foods, and stores are being equipped in this manner by the company until a more general application of quick freezing makes a cabinet for frozen foods in general a standard item in retail store equipment.

What Causes Changes In Frozen Fruit?

DETERIORATION in the quality of frozen fruit due to normal ripening processes, anaerobic respiration, and oxidation following injury to the tissue by freezing or other causes often is erroneously attributed to the activities of molds, yeasts, and other micro-organisms, said Dr. C. A. Magoon, of the U. S. Bureau of Plant Industries in a preliminary report at the January meeting of the National Preservers' Association in Chicago. While micro-organisms may cause changes in fruits, similar in appearance, it must be remembered that they are not invariably responsible for deterioration in quality of frozen fruit packs. When normal ripening is arrested, as, for instance, by freezing, chemical changes sometimes can occur, commonly recognized by the darkening of the tissues, the deterioration of color, or the development of unnatural flavors. These changes are due to oxidation of certain constituents of the fruit.

On the other hand, when changes that are due to micro-organisms do occur, bacteriologists believe that the molds and yeasts are of greater importance than bacteria, particularly in the acid fruits now used for preserving purposes. However, if the frozen pack industry undertakes the packing of vegetables, as it seems to be anxious to do, bacteria will certainly become of very great importance as affecting the spoilage and healthfulness of the product.

Sources of contamination of the fruit with micro-organisms were found to be partly decayed berries, juice from overripe or bruised fruit, previously used berry baskets and crates, dust, and soil.

To eliminate organisms that cause spoilage and loss, careful grading and thorough inspection to remove partly decayed and rotten berries was recommended. The inspection must take place before the fruit is washed, for after the surface of the berries are wetted with water, the presence of molds is much more difficult to detect by the eye. After proper sorting, adequate washing is desirable to remove dirt and adhering organisms, but it must be pointed out that although it is possible to reduce the number of organisms present on the fruit by as much as 50 per cent, this can be done only by washing with fresh clean water. If the wash water is allowed to become dirty it may become a source of universal contamination.

The possibility of transmission of disease germs makes it imperative to exert the highest degree of care in inspecting employees for health and personal cleanliness until the fate of disease-producing bacteria in frozen foods has been thoroughly studied.

Rapidity of chilling to the freezing point or lower is another very important feature of the production of frozen berries, for a very considerable growth of micro-organisms may occur in the berries before they have reached the freezing temperature.

C. E. HUME, of the G. W. Hume Company, San Francisco, Calif., the new president of the National Canners' Association.

TRADE NOTES

CONTINENTAL CAN COMPANY plans to build a new plant in Jacksonville, Fla., according to the *Wall Street Journal*. The new unit, which will supply fruit and vegetable canners in this territory, will be placed in operation as soon as the necessary equipment can be installed.

CUBAN CANE PRODUCTS COMPANY, INC., formed under reorganization plans to acquire the assets of the Cuba Cane Sugar Corporation, have received approval for the sale from the federal court.

FROSTED FOODS, INC., a subsidiary of General Foods Corporation, will hold a controlling interest in a new company formed by a merger of the Batchelder & Snyder Company, Arthur E. Dow Company, and William A. Doe Company, all of Boston, Mass. The new company will be known as Batchelder, Snyder, Dorr & Doe Company. Activities of the new company will be concentrated in the Boston plant of Batchelder & Snyder Company, where quick freezing apparatus is in the process of installation.

KOLBE INSTANT FREEZING SYSTEMS, involving the "floating pan" and "diving bell" methods which have been operated as a part of S. C. Bloom & Company, Chicago, Ill., is now set up as an independent unit under the direction of Carl F. Kolbe and Robert Kolbe. Headquarters will remain at 53 West Jackson Boulevard, Chicago.

NATIONAL DAIRY PRODUCTS COMPANY recently acquired three new companies, one, the Sugar Creek Creamery Company, doing an annual business in excess of $12,000,000 a year. Its main office and plant are at Danville, Ill. In addition to other products, it manufactures 22,000,000 pounds of butter a year. The second company acquired, the Plymouth Rock Ice Cream Company, had sales totalling $443,710 in the 9 months ending Sept. 30, 1929, mostly in the neighborhood of Boston. Creme-Freez, Ind., of Lynn, Mass., was acquired through the General Ice Cream Corporation.

NATIONAL BRANDS, INC., has been incorporated in Delaware to acquire ownership of companies manufacturing articles distributed through retail grocery stores. It has acquired the Quaker Products Company, of Philadelphia, and is negotiating for the American Dairies Company, of Detroit. A. Victor Hughes, president of the Crosby & Hill Company, of Wilmington, Del., is president of the new organization; R. A. McKee, president of the Defiance Dairy Products Company, of Defiance, Ohio, is vice-president; and H. Ruthven Crowley, president of the American Mint Company, of Philadelphia, is secretary and treasurer.

RICE GROWERS' ASSOCIATION OF CALIFORNIA recently purchased the rice mill of the California State Rice Milling Company at Washington, Calif. The personnel of the mill will not be changed. The Rice Growers' Association took charge of the mill on Feb. 1.

SWIFT & COMPANY recently purchased the packing plant of the Associated Meat Company of California, Vernon, Calif. The newly acquired business, which does not include the retail markets operated by the Associated Meat Company, will be maintained under its own name and no changes will be made at the present time.

THE PARKSIDE DAIRY, Fresno, Calif., has just opened for business in a new creamery and pasteurization plant erected at a cost of about $130,000. The Parkside Dairy is a subsidiary of the Golden State Milk Products Company of California.

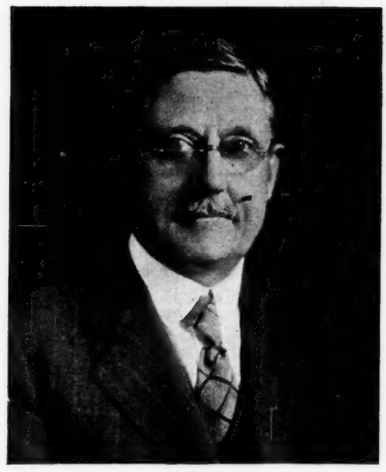
VAN CAMP OIL COMPANY, a new subsidiary of the Van Camp Packing Company, Indianapolis, Ind., has been organized to manufacture cottonseed oil products. Plants in Louisville, Ky., and Baltimore, Md., will be operated by the new organization.

WESTERN DAIRY PRODUCTS, INC., is the new name of the California Dairies, Inc., according to an announcement by S. H. Berch, president. Mr. Berch states that the change in name was made in order to conform more closely to the name of the parent organization, which is Western Dairy Products Company. The Western Dairy Products, Inc., will handle wholesale milk and "Sunfreze" ice cream sales in southern California.

PERSONALS

M. S. CANADAY, formerly district superintendent of the Snider Packing Company, Wayland, N. Y., has resigned to become factory manager at the new canning plant of Reid, Murdoch & Company, Rochester, Minn., packing peas and corn.

THOMAS H. BRODHEAD has been promoted to the position of distribution manager of Standard Brands, Inc. Mr. Brodhead was formerly distribution manager of the division consisting of the Pittsburgh, Buffalo and Philadelphia districts. He also has served as distribution manager of the Pittsburgh district and sales manager of that district.



E. L. POWELL, of the New Orleans Coffee Company, New Orleans, La., re-elected president of the National Syrup and Molasses Association.

F. M. DEBEERS has been appointed general sales manager of the J. P. Devine Manufacturing Company, Mount Vernon, Ill. In 1924 Mr. deBeers resigned the presidency of the Swenson Evaporator Company to undertake the development of sirup manufacture for the Sunmaid Raisin Association. Later he was associated with R. A. Watson Orchards, Inc., Chicago, Ill., in the production department.

HAROLD G. FERGUSON, president of the Harold G. Ferguson Corporation, has been elected a director of the Southern Sugar Company.

A. F. GERHARD, formerly head of the baking school at the Dunwoody Institute, Minneapolis, Minn., has recently taken a position with the Paul Schulze Baking Company, Chicago, Ill.

WILLIAM C. LUCKOW, formerly chemist at the Wahl-Henius Institute of Fermentology and the American Institute of Baking, has joined the laboratory of W. E. Long Company, Chicago, Ill.

ROSS MENDENHALL, Akron, Ohio, has been elected president of the Ohio Ice Cream Manufacturers' Association.

J. D. O'KEEFE has been elected president of Wesson Oil and Snowdrift Company. WHITNEY BANK was elected to the board of directors, succeeding the late John E. Bouden.

BRYCE B. SMITH, president of the Consumers' Bread Company, is prominently mentioned as a candidate for Mayor of Kansas City, Mo.

DOUGLAS SCALLEY, district manager in Idaho for the Utah-Idaho Sugar Company, has been appointed Utah district manager, a recently created position, and WILFORD Y. CANNON, who recently resigned as assistant general

manager for the Amalgamated Sugar Company, has been named to succeed Mr. Scalley.

GROVER D. TURNBOW, Oakland, Calif., was re-elected president of the Ice Cream Institute of California at a meeting of the board of directors of the association recently held in Los Angeles. JOHN F. EASTWOOD, manager of the Golden State Milk Products Company, Los Angeles, Calif., was elected vice-president; and JAY H. KUGLER, manager of the *Western Confectioner,* San Francisco, Calif., was re-elected secretary-treasurer.

OBITUARY

JOSEPH H. BRAGDON, vice-president and general manager of Bragdon, Lord & Nagle, a subsidiary of the McGraw-Hill Publishing Company, and editorial director of *Textile World,* died on Feb. 19 at his home in New Rochelle, N. Y.

JOHN N. COBB, dean of the College of Fisheries at the University of Washington, Seattle, Wash., died Jan. 13 at La Jolla, Calif. He was 61 years old. His activity in the fishing industry dated from 1895, when he joined the Bureau of Fisheries as field agent. He was for four years editor of the *Pacific Fisherman* after leaving the government service in 1912 and became general superintendent of the Alaska Packers' Association in 1917. When the College of Fisheries was founded at the University of Washington in 1919, he was chosen as dean and held this position until his death. He was the author of several books and of many technical articles and reports.

PAUL HASSACK, a world authority on the manufacture of vinegar, died in Philadelphia, Pa., on Jan. 14, shortly after his arrival in the United States from Gars am Kamp, Austria. Mr. Hassack, whose research and writings did much to revolutionize manufacturing methods in the vinegar industry, had lately carried on an extensive consulting service in Europe and America. He was born at St. Poelten, Austria, in 1869.

J. S. HOFFMAN, president of the J. S. Hoffman Cheese Company, died on Jan. 17 at his home in New York City.

CHARLES T. HUTCHINSON, president of the McGraw-Hill Company of California, editorial director of *Electrical West,* and long a prominent figure in engineering circles and technical journalism on the West Coast, died suddenly on Feb. 12 at Oakland, Calif.

JOHN F. HILDEBRAND, one of the best known figures in the baking industry in the vicinity of New York, died on Feb. 8 at his home in Brooklyn. Mr. Hildebrand was 76 years old. With his brother, Mr. Hildebrand conducted a bakery in Brooklyn for many years, and later became president of the Shults Bread Company. When this company was absorbed by the United Bakeries Corporation, which was in turn incorporated into the Continental Baking Company, he resigned to become president of the Fulton Savings Bank of Brooklyn.

W. M. KILPATRICK, superintendent of the citrus grove department of the American Agricultural Chemical Company, died at Bartow, Fla., on Feb. 16. He was 65 years old.

ROBERT OXNARD, former president of the American Sugar Refining Company and of the American Beet Sugar Company, died at his home in San Francisco, Calif., on Feb. 9. With his brother Henry T. Oxnard, he established one of the first beet sugar factories in the West at Grand Island, Neb., in 1890. Later the two brothers acquired vast sugar beet fields in the San Joaquin valley in California. Mr. Oxnard also was chairman of the board of the California Sea Products Company.

CHARLES A. WARD, chairman of the board of directors of the Ward Baking Company, died of heart failure on Feb. 10 at his home in New Rochelle, N. Y. Mr. Ward was the eldest of the nine children of the late Robert B. Ward, who with his brother founded the organization which bears their name. He succeeded his own brother, William B. Ward, as chairman of the board following the sudden death of the latter, also by heart failure, a year ago.

New Construction

Abbatoir, Etc.—F. G. Vogt Co., 30th and Race Sts., Philadelphia, Pa., is having revised plans prepared for the construction of a 4 story, 112 x 255 ft. abbatoir, etc. at 36th St. and Grays Ferry Rd. C. B. Comstock, 110 West 40th St., New York, N. Y., is architect.

Bakery—Alton Bakery & Catering Co., c/o J. J. Ruby, Pres., 1828 Evergreen St., Alton, Ill., awarded contract for the construction of a 3 story 50 x 99 ft. bakery to Wimmer Contracting Co., Victoria Bldg., St. Louis, Mo.

Bakery — Constructing Quartermaster, Camp Devens, Ayer, Mass., will receive bids until Mar. 6 for the construction of a bakery. Private plans.

Bakery—Dugan Bros., L. Finklestone, 945 Main St., Bridgeport, Conn., will receive bids about Mar. 1 for the construction of a bakery at Boston Ave., Glenwood and Hawley Sts. Estimated cost $325,000. H. Holder, 242 Franklin Ave., Brooklyn, N. Y., is architect.

Bakery—Fisher Hotshop Bakery Inc., 11th and Austin Sts., Waco, Tex., awarded contract for the construction of a 2 story bakery to J. E. Johnson Construction Co., 2407 Colcord Ave., Waco. Estimated cost $125,000.

Bakery—General Baking Co., 420 Lexington Ave., New York, N. Y., will receive bids after May 1 for the construction of a bakery at Detroit, Mich. Estimated cost $1,000,000. C. B. Comstock, 122 East 42nd St., New York, N. Y., is architect.

Bakery—H. S. Harper, 125 East 38th St., New York, N. Y., plans to remodel building at 51 Christopher St. into bakery plant. Estimated cost $31,000. W. B. Bayard Willis, 171 Madison Ave., Archt.

Bakery—National Biscuit Co., 85 9th Ave., New York, N. Y., plans alterations to baking plant, 8 story, 75 x 206 ft. at 444 West 15th St. Estimated cost $200,000. L. Wirshing Jr., 85 9th Ave., New York, is architect.

Bakery — Owner c/o F. P. Friedman, 395 Springfield Ave., Newark, N. J., is having plans prepared for a 1 story addition to plant including baking ovens and baking machinery at 349 Hawthorne Ave. Estimated cost $40,000.

Bakery—White House Baking Co., 11 Florence Pl. Lawrence, Mass., plans addition and alterations to bakery. Estimated cost $40,000. J. G. Morissette, 575 Essex St., Lawrence, is architect.

Biscuit Plant — Acton Biscuit Co., Acton Vale, Que., plans the construction of new biscuit plant. Estimated cost $50,000.

Warehouse—C. J. Haase and R. J. Wilkinson of Marx & Bensdorf, Monroe and South Second Sts., Memphis, Tenn., awarded contract for the construction of a 100 x 125 ft. warehouse at Iowa and Kansas Sts. to Memphis Construction Co., 160 Union St., Memphis. Estimated cost $36,000. Loose Wiles Biscuit Co., R. A. Searles, Mgr., 132 Webster St., Memphis, is lessee.

Bottling Plant—Aberdeen Coca Cola Bottling Co., O. N. Hale, Local Mgr., Aberdeen, Miss., plans a new bottling plant.

Bottling Plant—Coca Cola Bottling Co., 214 Fort St., Chattanooga, Tenn., will soon award contract for the construction of a 2 story, 82 x 120 ft. bottling plant including separate heating and power plant at old Brewery site. Estimated cost $150,000. W. Crutchfield & Associates, First National Bank Bldg., Chattanooga, are architects. Also awarded contract for a 1 story, 96 x 100 ft. plant at Hamilton, Ont. to Frid Construction Co., Ltd., 6 Hugheson St., Hamilton. $50,000.

Bottling Plant—Mougy Bottling Works, Wooster, O., will receive bids about Mar. 28 for the construction of a 1 story bottling plant. Estimated cost $40,000. Private plans.

Canning Plant—E. J. Rushart, Locust Grove, Mo., plans the construction of a canning plant at Sand Springs, Okla. Estimated cost $25,000. Private plans.

Canning Plant—City of Rockland, Ont., J. E. Chenier, Mayor, had tentative plans made for the construction of a canning plant. Estimated cost $40,000.

Canning Plant—Connon's Bros., Blacks Harbour, N. S., plans the construction of a canning plant at Freeport near Digby. Estimated cost $25,000.

Canning Plant—Libby, McNeill & Libby, Chatham, Ont., plans a canning plant at Thedford and Clinton Sts.

Canning Plant—Mayhaw Canning Co., T. M. Ferris, Mgr., Laurel, Miss., plans a 60 x 60 ft. addition to canning plant.

Canning Plant — Uddo-Taormina Co., Donna, Tex., awarded contract for the construction of a plant for canning tomatoes and tomato paste to Merriweather & Sauer, Harlingen, Tex. Estimated cost $45,000. Owners in the market for complete machinery and equipment. Later on plant will be extended for canning citrus and other vegetables.

Canning Plant Addition — Canadian Canners Ltd., Simcoe, Ont., plans a 2 story addition to canning plant at Dunnville. Estimated cost $75,000. Private plans.

Canning Plant Addition—Minnesota Valley Canning Co., Le Sueur, Minn., awarded contract for addition to canning plant at Blue Earth to J. B. Nelson Constr. Co., Mankato, Minn.; power plant to Commonwealth Electric Co., 417 Broadway, St. Paul. Total estimated cost $450,000.

Creamery—Artic Dairy Products Co., N. Durand St., and Daniel Rd., Jackson, Mich., is having plans prepared for the construction of a 1 and 2 story, 200 x 240 ft. creamery including bottling plant, etc. Estimated cost $150,000. Private plans. New bottling equipment will be installed.

Creamery Plant—Lamesa Milk Products Co., c/o S. L. Forrest, Chn. Bldg., Lamesa, Tex., awarded contract for a 2 story, 72 x 130 ft. creamery plant to H. C. Allen, Lamesa. Estimated cost $44,000.

Creamery — Wasco Creamery & Construction Co., Wasco, Calif., will build a 3 story creamery. Estimated cost $150,000. Work will be done by day labor.

Creamery Plant—Western Creamery Co., 1116 North Boston St., Tulsa, Okla., is having preliminary plans prepared for the construction of a new creamery plant. Estimated cost $75,000. Private plans.

Dairy Plant—Acme Farmers Dairy Ltd., P. A. Thomson, Mgr., Hamilton, Ont., will receive bids about Mar. 1 for the construction of a 2 story, 60 x 135 ft. dairy plant on Main St. Estimated cost $100,000. Private plans. Interested in prices on complete equipment.

Dairy Plant — Canham Dairies Ltd, Fresno, Calif., awarded contract for the construction of a dairy plant on Hamilton Ave. to E. J. Heffner, Fresno. Estimated cost including equipment $125,000.

Dairy Plant—Clark Dairy, Ltd., H. J. Clark,

V. Pres., Ottawa, Ont., plans a new 3 story dairy plant. Estimated cost $60,000 to $70,000.

Ice Cream Plant—Good Humor Ice Cream Co., 125 Santa Monica Blvd., Los Angeles, Calif., awarded contract for the construction of a 1 and 2 story, 60 x 101 ft. ice cream plant, etc. at 948-58 Sycamore Ave. to Hamm, Grant & Bruner, Inc., 607 Ferguson Bldg., Los Angeles. Estimated cost $38,000.

Milk Plant—Blue Valley Creamery Co., J. H. Taylor, Mgr., Parsons, Kan., awarded contract for the construction of a milk plant to F. A. Every & Son, Parsons. Estimated cost $75,000.

Dairy Plant—Gaffney Bros., 625 Plantation St., Worcester, Mass., is having plans prepared for the construction of a dairy plant. Estimated cost $40,000. H. L. Meacham, 120 Front St., Worcester, is architect.

Ice Cream Plant — Fairmont Creamery Co., C. L. Dilts, Dist. Mgr., 608 Bolivar Rd., Cleveland, O., awarded contract for a 4 story, 86 x 171 x 260 ft. ice cream plant at West 17th St. and Wiley Ave. to Cleveland General Construction Co., Western Reserve Bldg., Cleveland. Estimated cost $600,000.

Ice Cream Plant—General Ice Cream Co., 114 Bristol St., New Haven, Conn., awarded contract for a 2 story, 18 x 70 ft. ice cream plant to Kelley & Wood, 149 Temple St., New Haven. Estimated cost $15,000.

Ice Cream Plant—Grisham Ice Cream Co., c/o B. Grisham, Corpus Christi, Tex., acquired a site and plans the construction of an ice cream plant, 500 gal. capacity at San Benito. Private plans. Machinery and equipment will be required.

Ice Cream Manufacturing Plant Addition—Maryland Creamery Co., 1726 East Pratt St., Baltimore, Md., will receive bids late in April for addition to ice cream plant. Estimated cost $60,000. McCormick Co., Inc., 121 South Negley St., Pittsburgh, Pa., is architect.

Milk Plant — Milk Products Co., Hiawatha, Kan., awarded contract for a 2 and 3 story, 72 x 130 ft. milk plant to N. Reynolds, Hiawatha. Estimated cost $40,500.

Milk Plant—North Louisiana Dairy Products Inc., T. H. Mills, Pres., Ruston, La., awarded contract for the construction of a 72 x 130 ft. milk plant to C. E. Andrews, Ruston. Estimated cost $45,000.

Cold Storage Plant—Norfolk Fruit Growers Association, J. E. Johnson, Mgr., Simcoe, Ont., will receive bids until Mar. 15 for the construction of a 4 story, 80 x 80 ft. cold storage plant. Estimated cost $100,000. E. H. Darling, 36 James St. S., Hamilton, is engineer. Interested in prices on complete equipment.

Cold Storage Warehouse—Union Storage Co., 1409 First National Bank Bldg., Pittsburgh, Pa., is having plans prepared for a 6 story, 154 x 264 ft. dry and cold storage warehouse at Smallman St. between 22nd and 23rd Sts. Estimated cost $1,000,000. Richard Irving & Co., Vandergrift Bldg., Pittsburgh, are architects.

Ice and Cold Storage Plant—Mangham Ice Co. Inc., P. Fudickar, Pres., Mangham, La., will soon receive bids for the construction of an ice and cold storage plant. Estimated cost $40,000.

Ice Plant—Arkansas Power & Light Co., Pine Bluff, Ark., awarded contract for the construction of an ice plant at Forrest Park to Phoenix Utility Co., Pine Bluff. Estimated cost $75,000.

Ice Plant—Cape Refrigerating Co., Plymouth, Mass., awarded contract for the construction of an ice plant to J. Lalagucci, Plymouth. Estimated cost $42,500. Equipment contract.

Ice Plant—City of Pascagoula, Miss., is having plans prepared for the construction of an ice plant, 25 ton daily capacity and storage of 150,000 to 200,000 lbs. of seafood. Estimated cost $45,000. E. K. Strahan, Pere Marquette Bldg., New Orleans, La., is engineer.

Ice Plant—Erick Ice Co., Erick, Okla., is having plans prepared for the construction of a 10 ton raw water ice plant. Estimated cost $25,000. Private plans.

Ice Plant—Giorgio Ice Co., Christopher and Newport Sts., Brooklyn, N. Y., plans the construction of an ice plant. Estimated cost $25,000. A. W. Barbour, Review Ave., Long Island City, is architect.

Ice Plant—Rubel Ice Corp., c/o W. Steele & Sons Co., 124 North 15th St., Philadelphia, Pa., Engrs. and Contrs. will build 1 story, 66 x 195 ft. ice plant at Parrish and June Sts. Estimated cost $100,000.

Ice Manufacturing Plant—Springfield Ice Co., 91 Dwight St., Springfield, Mass., plans the construction of a new ice manufacturing plant. Estimated cost $75,000. Architect and engineer not selected.

Ice Plant—Central Power & Light Co., National Bank of Commerce Bldg., San Antonio, Tex., awarded contract for the construction of a 50 ton ice plant at Raymondville to Velten Construction Co., Harlingen and Brownsville. Estimated cost including equipment $45,000.

Ice Plant—Home Ice Co., W. H. McGuire, Mgr., Tupelo, Miss., plans to expend $21,000 to $25,000 for extensions and improvements to ice plant.

Ice Plant—National Service Co., 150 Congress St., Boston, Mass., awarded contract for the construction of an ice plant at Woonsocket, R. I., to E. D. Ward Co., 82 Foster St., Worcester, Mass.

Ice Plant—Southern New England Ice Co., 48 Edwards St., Hartford, Conn., awarded contract for a 150 ton ice manufacturing plant on Hamilton St. to Bartlett-Brainard Co., 252 Asylum St., Hartford. Estimated cost $150,000.

Ice and Power Plant—Louisiana Ice & Utilities Co., New Orleans, La., awarded contract for a 70 x 90 ft. ice and power plant to A. C. Stewart, Baton Rouge. Estimated cost $31,694.

Ice Manufacturing and Storage Building—Rubel Coal & Ice Co., 937 Fulton St., Brooklyn, N. Y., plans the construction of a 1 story, 72 x 86 ft. manufacturing and ice storage building at Eagle Ave. and 158th St., New York. Estimated cost $100,000. H. J. Nurick, 44 Court St., Brooklyn, is architect and engineer.

Ice. Storage Building—Boston Ice Co., 11 Deerfield St., Boston, Mass., plans the construction of an ice storage building at Hurley and Second Sts. C. L. Wier, 41 East 42nd St., New York, N. Y., is architect.

Ice Plant—Carbon Dioxide & Chemical Co., c/o M. P. Smith, V. Pres., Salt Lake City, Utah, plans the construction of a dry ice plant for using dioxide gas discovered on the Farnum Dome, Farnum, present flow 12,000,000 cu.ft. per day. Estimated cost $100,000.

Dry Ice Plant—Dry-Ice Corp., c/o Austin Co. of California, 777 East Washington St., Los Angeles, Calif., Engrs. and Contrs., will build a 1 story, 110 x 145 ft. plant on Pitts St. Estimated cost $60,000.

Plant—St. Louis Carbonic Ice Co., 813 Hemstead St., St. Louis, Mo., is having preliminary plans prepared for the construction of a plant to produce vapor ice, a dry refrigerant and carbonic gas at Valley Park. Estimated cost $300,000.

Flour Corn and Mixed Feed—Theodore Stivers Milling Co., Rome, Ga., will build a 6 story flour, corn and mixed feed mill 100,000 bu. capacity, also 2 story warehouse and three storage tanks. Estimated cost $200,000. Work will be done by day labor.

Grain Elevator—Canada Steamship Co., Ltd., 715 Victoria St., Montreal, Que., awarded contract for superstructure of a grain elevator, 2,500,000 bu. capacity at Kingston, Ont., to Carter-Halls-Aldinger Co., Ltd., Royal Bank Bldg., Winnipeg, Man.

Grain Elevator—Wabash Elevator Co., 33rd and River Sts., Chicago, Ill., operated by Uhlmann Grain Co., 1122 Bd. of Trade Bldg., Kansas City, Mo., awarded contract for addition to grain elevator, 1,000,000 bu. capacity at Kansas City, to James Stewart & Co., 343 South Dearborn St., Chicago, Ill.

Grain Mill—Lake of the Woods Milling Co., 344 Dupont St., Toronto, Ont., will soon award contract for a 5 story addition to milling plant. Estimated cost $100,000. Margeson & Babcock, McLean Bldg., University Ave., Toronto, are engineers.

Grain Elevator — Oklahoma Wheat Growers Association, Enid, Okla., awarded contract for the construction of a grain elevator, 1,000,000 bu. capacity to Jones-Hettelsater Co., 600 Mutual Bldg., Kansas City, Mo. Estimated cost $500,000.

Grain Elevator Addition—Houston Port Commission, Houston, Tex., will receive bids until Mar. 7 for addition to grain elevator. Estimated cost $500,000. J. Metcalf & Co., 111 West Jackson Blvd., Chicago, Ill. are engineers.

Grain Storage Additions—Ralston Purina Co., 121 Prenatt St., Buffalo, N. Y. and 2300 Rochester St., Kansas City, Mo., awarded contract for a concrete storage tank, 130 ft. high at Buffalo to Hettelsater Construction Co., 600 Mutual Bldg., Kansas City. $130,000; also plans a grain storage addition at Kansas City. $40,000.

Grain Elevator — Searle Grain Co., 1254 Chamber of Commerce Bldg., Minneapolis, Minn., plans the construction of a grain elevator at 38th and Dwight Sts. Estimated cost $150,000. Private plans.

Grain Elevator and Storage Building—Kimbell Milling Co., 1800 South Main St., Fort Worth, Tex., has work under way on the construction of a grain elevator and storage building, 800,000 bu. capacity. Jones-Hettelsater Construction Co., 600 Mutual Bldg., Kansas City, Mo., is engineer.

Grain Warehouse—Tacoma Grain Co., Waterfront, Tacoma, Wash., awarded contract for the construction of a warehouse on Hustin Way to Albertson Cornell Bros., 1113½ A St., Tacoma. Estimated cost $43,000.

Grain Storage Tanks—Occident Elevator Co., Bd. of Trade Bldg., Duluth, Minn., awarded contract for forty-eight concrete storage tanks to increase facilities of grain elevator on St. Louis Bay, east of Garfield Ave. to afford a storage capacity of 2,000,000 bu. of grain to Barnett & Record Co., Lyceum Bldg., Duluth. Estimated cost $500,000.

Grist Mill—Broun Co., Norval, Ont., plans the construction of a grist mill. Estimated cost $100,000.

Food Products Warehouse—Owner, c/o H. C. Hubbell, 718 First National Bank Bldg., Cincinnati, O., will soon award contract for the construction of a warehouse and manufacturing building at Fredonia and Melbourne Sts. and Beresford Ave., Walnut Hills. Estimated cost $450,000. The Great Atlantic & Pacific Tea Co., 420 Lexington Ave., New York, N. Y., is lessee.

Grocery Warehouse — First National Stores Inc., Davy Bros. Division, P. M. Davy, Main and Atlantic Sts., Bridgeport, Conn., plans the construction of a grocery warehouse on Barnum Ave. Estimated cost $300,000. Architect not selected.

Grocery Warehouse—Great Atlantic & Pacific Tea Co., Sylvan Rd., Atlanta, Ga., awarded contract for the construction of a 4 story, 107 x 152 ft. grocery warehouse on Fair St. to Flagler Co., Red Rock Bldg., Atlanta. Estimated cost $200,000.

Market Building and Produce Warehouse—Gardeners & Ranchers Association, W. Semansa, Pres., Portland, Ore., will soon award contract for a 2 story, 200 x 460 ft. public market building and produce warehouse at Belmont, Taylor, 10th and 11th Sts. Estimated cost $400,000. Jacoberger & Smith, Railway Exchange Bldg., Portland, are architects.

Relish Manufacturing Plant—California Supply Co., 738 Folsom St., San Francisco, Calif., is having plans prepared for a 2 story, 110 x 160 ft. relish manufacturing plant at 7th and Brannard Sts. J. E. Krafft & Son, Phelan Bldg., San Francisco, is architect.

Salmon Storage Terminal—Port Commission, Seattle, Wash., awarded contract for four 2 story, 90 x 240 ft. transit sheds to be used as a salmon storage terminal at Smith Cove to Schere & Carlson, Terminal Sales Bldg., Seattle. Estimated cost $400,000.

Poultry Warehouse—Utah Poultry Producers Co-Operative Association, C. C. Edmonds, Gen. Mgr., Dooly Bldg., Salt Lake City, Utah, is having preliminary plans prepared for a 3 and 5 story, 75 x 200 ft. warehouse, etc. Estimated cost $200,000. Ashton & Evans, Vermont Bldg., Salt Lake City, are architects.

Packing and Service Plant—Armour & Co., 120 Broadway, New York, N. Y., will build a 4 story packing and service plant at 608 West 40th St. for C. E. Appleby, 17 John St., New York. Estimated cost $250,000. Work will be done by separate contracts. Owner will soon receive bids for cold storage and packing plant equipment. New York Butcher's Dressed Meat Co., 491 West 39th St., New York, lessee.

Packing Plant — Exchange Orange Produce Co., Ontario, Calif., awarded contract for the construction of a 3 story, 70 x 85 ft. packing plant to The Austin Co. of California, 777 East Washington St., Los Angeles.

Packing Plant (Citrus) — Hermosa Vista Orange Growers Association, Mesa, Ariz., is having preliminary plans prepared for the construction of a citrus packing plant. Estimated cost $80,000.

Packing Plant (Citrus)—Texas Citrus Fruit Growers Exchange, c/o J. Shary, Mission, Tex., plans the construction of a 2 story citrus packing plant. Estimated cost $100,000. Machinery and equipment will be required.

Packing Plant (Lettuce)—Salinas Valley Ice Co., Salinas, Calif., will soon award contract for a 1 story, 50 x 350 ft. lettuce packing plant. Butner & Stranahan, Glickbarg Bldg., Salinas, are architects.

Packing Plant (Meat)—Batchelder & Snyder Co., 55 Blackstone St., Boston, Mass., awarded contract for a 4 story packing plant and storage building including electric refrigeration system, etc. at 65-67 Blackstone St. to E. J. Farrell Co., 473 Tremont St., Boston. Estimated cost $50,000.

Packing Plant—Swift & Co., Union Stock Yards, Chicago, Ill., will soon award contract for the construction of a 3 story, 76 x 110 ft. packing plant at Garden City, Kan. Private plans.

Packing Plant—A. Glauser, 2130 Market St., St. Louis, Mo., is having preliminary plans prepared for the construction of a 2 story packing plant at Spring Ave. and Frisco Ry. Estimated cost $40,000.

Packing Plant (Walnut)—San Fernando Valley Walnut Growers' Assn., North Hollywood, Calif., plans the construction of a packing plant at San Fernando. Estimated cost $45,000. Architect not selected.